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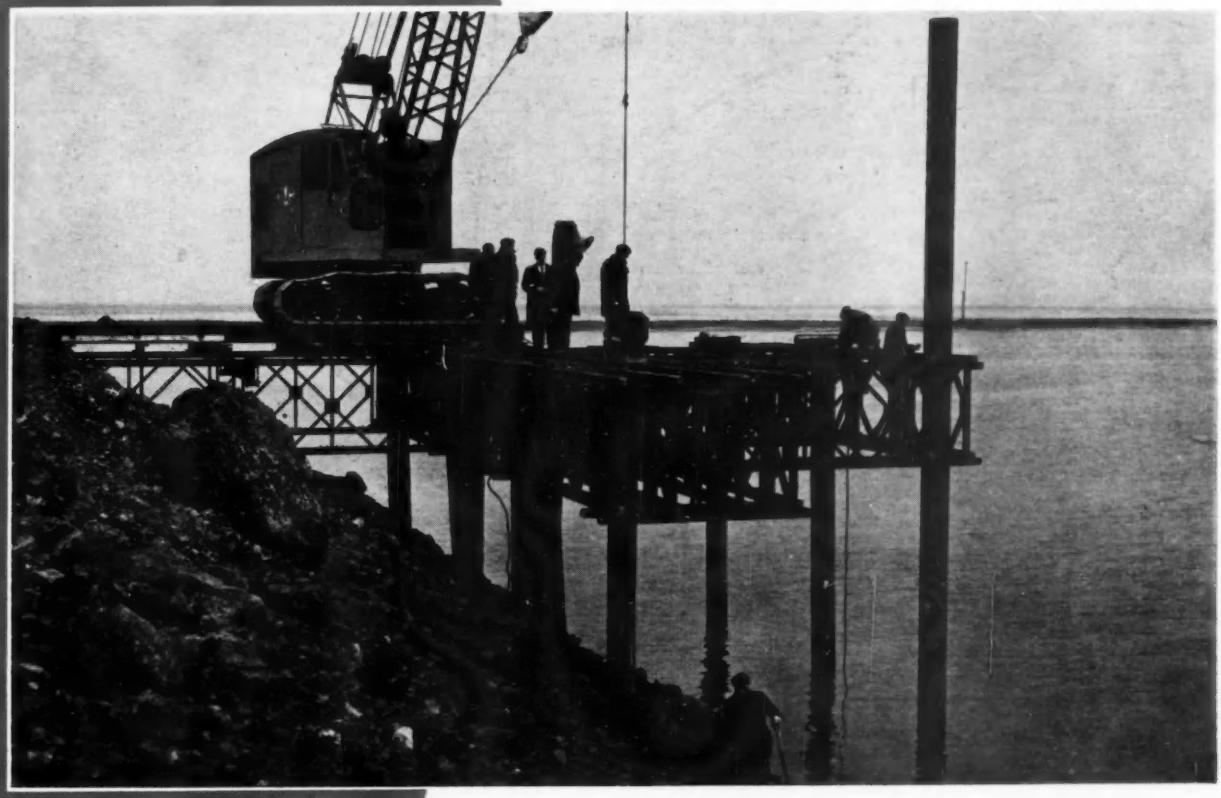

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AUTHORITY: The Tees Conservancy Commission.
CONSULTING ENGINEERS: Sir William Halcrow & Partners, M.M.I.C.E.
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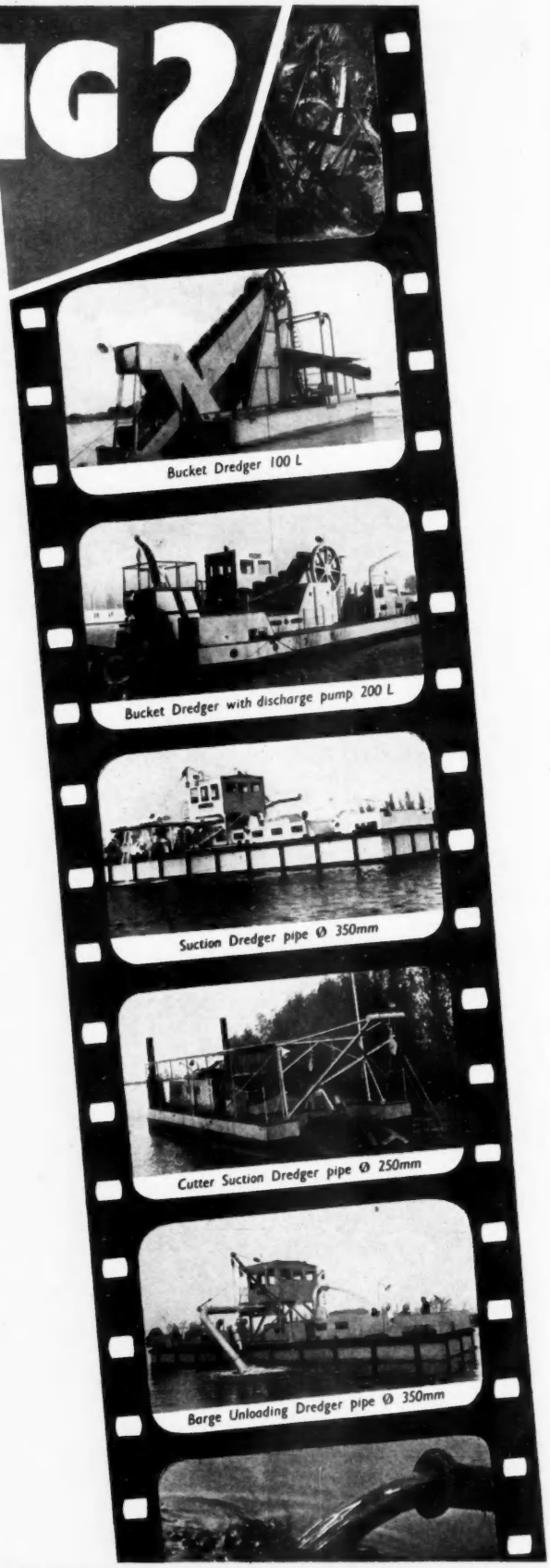

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Editorial Notes

The Port of Rotterdam.

In September last year we published an article describing the post-war development of the Port of Rotterdam having special reference to the Botlek project, designed primarily to accommodate the large increase in oil entrepot traffic. The article was most valuable, not only for its technical interest but even more so for the insight which it gave into administrative methods which so clearly evidence the close rapport which exists between Municipal, Provincial and State Governments of the Netherlands in developing Rotterdam into what is fast becoming the greatest complex of port services in the world today. Rotterdam is not to be considered as just one port, it is several, all geared to a common purpose, providing competition yet not countenancing injurious competition. For though inadequate facilities may ward off traffic it is not at all likely that commerce is enlarged by providing them to excess. The point is taken care of, as well as may be, by requiring private enterprise to furnish the risk capital for utilitarian services whilst the providers of the basic common-user facilities are secure in the knowledge that the cost of improvements, so merged in the land as to be inseparable from it, will automatically earn its due reward.

The second article by the same author which we print in this issue goes on to describe the master plan and its economic background in further detail, embracing the Europoort scheme and the new industrial developments on the south side of the New Waterway which it aims to bring into being. The project has of course been prompted by the buoyancy of the economy of N. W. Europe and the added dynamism which the European Association may well impart to it, for Rotterdam is ideally sited to serve the industries of the Rhine-Ruhr basin, undoubtedly the nerve centre of the commerce of the region. A characteristic of the principal ports of N. W. Europe is that, with few exceptions, they are some distance away from what is now considered deep water. Rotterdam is not really an exception, though the skill of the Dutch hydraulic engineers has made it appear so. The New Waterway is one of the very few examples of a trained channel, artificially formed, which has entirely fulfilled expectations. So good an overall balance has been achieved between the effects of land water and tidal water that little maintenance is required. The authorities are naturally averse to deepening the channel any further or doing anything which might disturb so satisfactory a regime. The vast Delta Plan, aimed at closing all the arms of the sea between the Maas and the Scheldt, would indeed provide a more concentrated flow of land water to permit an enlargement of the New Waterway to establish a new stable regime, but the different time scales (and traffic considerations also) have weighed against this. Accordingly, a new approach channel and a large reclamation at the entrance have been decided upon which will not only give access to extensive new wet basins and industrial sites, but will communicate also with the Botlek system of basins and the older wharf accommodation beyond, whilst restricting the penetration of sea water too far inland.

The whole scheme provides tremendous scope for development of a most diverse kind, a scope which is, perhaps, limited only by the traffic capability of the Rhine itself. The danger now is that, watching Rotterdam respond to the expanding opportunity of a hinterland linked by the Rhine and other waterways, the older ports of the Federal Republic of Germany may be induced to enter into a great deal of injurious competition among themselves in order to ensure survival. None of them have the same physical and geographical advantages of Rotterdam, however. Emden, for example, is primarily a port for bulk cargoes and, *inter alia*, it handles some 80 per cent of all the ore arriving at German ports. Yet it is doubtful whether it can be made accessible to vessels of more than 32,000 tons. Bremen has already entered into competition with it in this field although it lies some 45 miles up the Weser and vessels drawing more than 31 feet must use the Bremerhaven terminal. Hamburg, itself a great manufacturing centre, is inaccessible to loaded ships of more than 35,000 tons and the Elbe no longer leads to friendly markets. Wilhelmshaven with deep water at its door has perhaps the greatest potentiality for development and is already making sizeable inroads into Hamburg's established trade. All these ports have ambitious plans and it would indeed be unfortunate if, through excess of civic pride or private initiative, facilities were built to a point where the available commerce could not sustain them. Clearly it would be better for them to agree upon the tasks they should individually be carrying out. But the lesson of Rotterdam can be learned in other quarters too.

Electrical Services at General Cargo Docks

Among the wide range of subjects which we endeavour to cover in this Journal as representing good working practice in the multifarious activities of port operation, electrical matters may seem to have been strangely neglected. Electrical installations and equipment are nowadays remarkably reliable. A motor or generator is inherently a reticent and unobtrusive piece of machinery and the service it gives is too apt to be taken for granted. Outside the circle of electrical engineers little enough is known of the skill and foresight and careful maintenance which goes to make a trouble-free power distribution system upon which the operation of a port ultimately depends. It is most important that in this age of specialists the expert in one field should have a working knowledge, if not a thorough grasp, of the other man's problems. The paper we publish in this and in the succeeding issue (for pressure on our space compels us to print it in two parts) is of undoubted value in this respect for it provides a broad survey of specialist practice which has not hitherto been attempted in the particular field of working with which this Journal is most concerned.

Physical circumstances and the extent of industrialisation based

upon a port, though ancillary to its main business, are so widely differing that a survey of this kind can be made only in very general terms. Some port undertakings may themselves generate energy and distribute it throughout their domain although in the United Kingdom it is now almost a universal practice to purchase supplies in bulk from the national grid for their own use and for resale to individual tenants and licensees. Such a block of power can be considered as a favourable load by the supply authority but the port undertaking on that account will not secure any specially favoured terms and will be treated *pari passu* with ordinary private consumers. Similarly, it will not be able to exact significantly better terms from its consumers than they would enjoy if independently connected, despite the fact that it has to bear the capital cost and maintenance of the distribution network and of its unavoidable power losses. Certain economies are of course implicit in a (limited) ability to diversify peak demands but in general the solvency of this sector of working must rest on the fact that it forms part of an organisation which sells services into which the cost of electrical energy enters. If the port authority engages in any considerable industrial activities of a non-statutory character such as ship repairing, its electrical services become, in effect, a trading department, and added opportunities in that direction are open to it, but there may sometimes be objection to a public trust corporation thus entering into what might be held to be a prerogative of private enterprise. Speculation of this kind however, is outside the scope of the present note, but enough has been said already to emphasise that the responsibilities of a port authority in the field of electricity supply call for a high degree of professional and managerial skill which may not everywhere be fully appreciated. It may indeed be difficult to provide this if the scale of working is small.

In the examples given in the paper, the electrical services of the five principal South Wales Dock undertakings operated by the British Transport Commission are centrally administered. Design work, installation and maintenance on such a scale can therefore be adequately staffed and controlled with considerable economies and improved performance. The range of work carried out is most comprehensive and although such an aggregation may not be altogether typical, it provides material for an instructive paper which will be helpful in other circumstances where, though the scope may be smaller, parallels can certainly be found.

Two American Bulk Handling Plants

To the Chesapeake and Ohio Railway Company is accorded the distinction of owning and operating both the largest single coal-loading installation in existence, and also one of the most modern ore handling plants. Full information on these two plants has now been made available, and we are including in this issue an article upon their principal features, together with a brief description of a further new, but relatively small, coal-loading plant, having a capacity of some 2,000 tons per hour.

We also have received from Mr. T. F. Burris, the Chief Engineer of the owning Company, some interesting facts and figures regarding the operation of these plants. He informs us that the coal-loading plant at Newport News, has proved well able to maintain its design rating of 2,000 tons per hour, and that normal loading of slack coal has been slightly in excess of this figure.

The 6,000 tons per hour capacity coal-loading plant at Toledo was designed for loading to "Lake" vessels which have some 24—36 hatches, and which require little or no trimming work. The decision to employ one large capacity loading arm rather than two half-capacity units, would seem to be justified, particularly as an overall operational efficiency rate of nearly 75% has been achieved in loading these large bulk carriers. This plant has actually transferred 5,925 tons of coal from railway wagons to ships' holds in a single hour, and experience has shown an overall average loading rate of 4,400 tons per hour to be quite common when loading large vessels. When handling sticky fine coal the normal loading time for the conventional Lake type dumper vessel has been reduced from 29 hours to only 5½ hours which must be regarded as truly remarkable, in view of the large number of hatches involved, and the fact that several moves are required to fill each hatch.

Mr. Burris also reports that the high speed tandem rotary tipplers have been slowed down slightly, and are now operating on a cycle of 46 seconds as a result of "teething" troubles experienced with the rope-operated wagon-clamping devices. It was anticipated that this plant would engage in increasing duties as a result of the opening of the St. Lawrence Seaway and the plant owners accordingly provided a variable-speed belt type coal trimmer for dressing cargoes into the sometimes awkward 'tween-deck spaces of ocean-going vessels. However there has been little foreign export to date so that the coal trimmer has not yet been put to use as the discharge chute originally fitted is found to be the best tool for the loading of Lake vessels.

Actual performance figures for the ore unloading plant at Newport News indicate that an unloading rate in excess of 1,000 tons per hour per machine has been realised. A typical example is an overall average rate from docking to undocking, of 922 tons per hour per machine, realised on unloading the giant 40,000 d.w.t. carrier "Cosmic." It is reported that the plant handles both fine sticky ores and coarse lumpy ores, and that in either case the plant functions efficiently. The main belts are still in excellent condition, and a life of about 15 years is confidently expected from them. No troubles of consequence have been experienced and the owners report that if the plant were to be reproduced, it would be constructed with no design changes.

Information upon actual operating conditions and performance is of particular value to those investigating new design projects, and it is for this reason that we have included here a summary of the operator's experience.

Cargo Handling Problems

The conference of the International Cargo Handling Co-ordination Association held in London recently, together with the announcement of the Rochdale Commission on the working of the U.K. ports have already created discussion in transportation circles, on some of the underlying causes of failure to turn ships round quickly. The more obvious reasons are already well known and will no doubt have further ventilation during the coming months.

Every port authority, shipping company and master stevedore has problems that each is trying continuously to solve. The answer to these has not been brought nearer by the habit, inherent in port circles, of regarding each one as peculiar to its owner. Even to reveal the problem has often been looked upon as a breach of security.

How refreshing it was to hear Mr. J. O. Grieve of the Ben Line (whose paper read to the I.C.H.C.A. conference is published in this issue), bringing into the open several of the intensely practical problems that have had to be overcome in the daily working of his company's ships. No one will dispute that, after a lifetime in port working, there is still much to be learnt about the behaviour of cargo confined in the hold of a ship. To draw freely on the experience of others whilst adding one's own iota of knowledge to the pile, is the basic idea behind I.C.H.C.A. In his summing up, the Conference Chairman, Mr. I. S. Lloyd, remarked on the need for breaking down the barriers, that for too long, under the excuse of security, had prevented the full and free exchange of information between those with a common interest in the quicker turnround of ships.

The Post-War Development of the Port of Rotterdam

Details of the Europoort Scheme*

by Ir. Tj. J. RISSELADA
(Deputy Managing Director, Gemeentelijk, Havenbedrijf, Rotterdam.)

When the execution of the Botlek Extension Scheme was under way, it became apparent that the reasons which had led to its conception, still needed continued and vigorous attention. Further studies carried out by national and municipal planning departments indicated that by 1980 the available harbour area needed by port and industrial enterprises would be some 16,000 acres, which is practically double the area now covered by the port. By the end of this century, nearly 25,000 acres would be required, i.e. three times the existing harbour area. This estimate, in the light of present experience, seems rather conservative.

At the same time it was obvious that the increase in the dimensions of tankers would continue and that tankers of 100,000 d.w.t once considered pure fantasy, would soon be commonplace.

Apart from this, Germany's increasing oil consumption has led to the establishment of new refineries near the big industrial centres, which for the most part are concentrated in the Rhine-Ruhr area. To maintain regular supplies of crude oil a pipe-line appeared the most feasible proposition, and the most advantageous location for the terminal and the alignment of the pipe-line soon became a matter of international study. Whilst Germany had chosen Wilhelmshaven, a former naval-base favourably located on the deep and sheltered bay of the Jade, Rotterdam put forward a plan (Fig. 10) to construct a new deep water basin on the south bank of the mouth of the Nieuwe Waterweg on the isle of Rozenburg just opposite Hoek van Holland. This site could accommodate tankers of up to 70,000 d.w.t. with a draft of about 42-ft. 6-in. and would also provide ample space for the storage of oil.

Though in the first instance the competition with Wilhelmshaven seemed too strong for Rotterdam, after prolonged negotiations amongst the interested oil groups, it was finally decided to establish a terminal at both places. In view of the impending industrial expansion of its hinterland, however, the Rotterdam terminal, originally planned as a solitary unit was incorporated in the general scheme based on the prognosis mentioned before, at the same time allowing for accommodation of tankers of at least 100,000 d.w.t. The rapid increase in the number of tankers of more than 40,000 d.w.t. demanded that Rotterdam should have available as soon as possible a harbour area accessible to these very large tankers albeit at the outset there should be a limit of some 70,000 d.w.t.

In view of the far-reaching national interest involved, a committee was instituted by the Minister of Transport and Communications to study this problem and to set up the outlines of such a scheme on behalf of the entire harbour and industrial area in the estuary of the Rhine. This development scheme, covering the whole agricultural part of the isle of Rozenburg, was published early in 1958; after the land was acquired and the necessary funds were obtained, a start was made on the western part of the scheme opposite Hoek van Holland (see Fig. 11) at the end of that year.

Although this part of the plan became well known as Europoort (literally meaning Eurogate) this name, in fact, actually covers the whole area reaching eastwards to the Botlek area and westwards out into the sea off the present coast.

Proof that the inception of the apparently ambitious plan was not a grandiose adventure is shown by the fact that the majority of the Botlek sites are already occupied and that parts of the land, although only recently filled in, have already been leased and built on. In addition to noting the necessity for the rapid expansion of the port territory as a result of the increase in the number of ships and in the volume of cargo handled, it is also interesting to note the number of large-sized tankers which

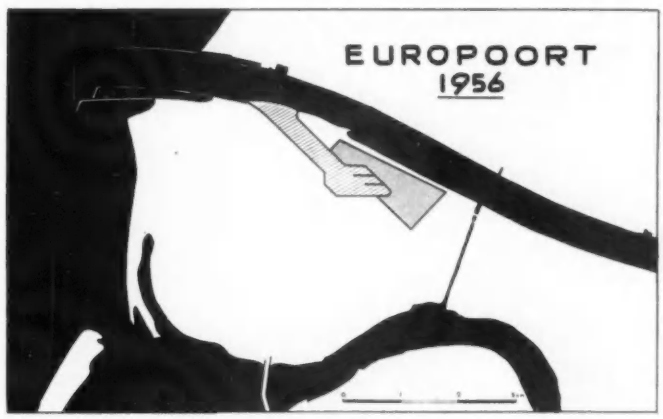


Fig. 10.

are increasingly using the port. The table (Fig. 12) shows the relation between the number of ships arriving in the port of Rotterdam during the last year and the corresponding draughts of 33-ft. and over.

General lay-out

As can be gathered from the maritime chart (Fig. 13) it was evident that nautical conditions off the coast favoured the approach and passage of the largest ships. Studies of the Rhine estuary, however, advised against a still further deepening of the Niewe Waterweg to Rotterdam in order to accommodate ships drawing over 42-ft. 6-in. of water, as it was considered essential to avoid risking disturbance of the now well-balanced river regime and to prevent any possibility of an increase in siltation. In view of the need to admit these big tankers in the very near future, however, it did not seem justified to wait until the Delta-works' closing off of the sea-arms had advanced sufficiently to allow the Niewe Waterweg to also be deepened without any objection. It therefore was decided to base the new lay-out on

* A description of the Botlek Harbour, Rotterdam scheme was published in the September 1960 issue of this Journal

a second entrance independent of the existing one and ultimately accessible for ships with a draught of at least 50-ft. Since in this second entrance the scouring effect could only be small, due to the limited capacity of the flood basin, it was judged desirable that it should run close to the mouth of the Niewe Waterweg whilst the shape of the bifurcation should comply with the nautical requirements of a safe passage in either direction in order to benefit as much as possible from the existing access channel. The design of the mouth as a whole, as regards the shape and the location of the outer and inner breakwaters and the place and situation of the entrances, has been the subject of thorough study by the Hydraulic Laboratory of Delft since the required solution had to guarantee, at a reasonable investment, a safe passage under all conditions and a minimum of maintenance, both somewhat contradictory demands.

The great advantage of a parallel second waterway separating the traffic flow to and from the Europoort area and from there to the more easterly harbours, is obvious. As the various Europoort basins have no separate connections with the Nieuwe Weterweg, confusion caused by crossing and trimming ships is prevented and thus the character of the Nieuwe Waterweg as a fast sea lane is safeguarded. This is all the more important in view of the expected increase in shipping when, in the near future, the Botlek area and the general cargo harbours now under construction come into full operation.

As is shown in Fig. 14 the western extremity of the plan projects some miles out into the sea (reference 6). Though the shape of the entrance is still tentative, the intention is to incorporate the enclosed triangular area off the coast in the extension scheme. This can be realised without serious difficulty as the major part of the submarine area is shallow and the greater part of the sand needed for reclamation can be obtained from the dredging of the entrance channel and the basins. Before the present plan was approved somewhat similar plans were put forward a couple of decades ago but were then considered rather extravagant.

With the aid of the comprehensive model tests, it is now being studied whether as an alternative to the solution given in illustration No. 1 it will perhaps be better to have the new and the existing mouth bifurcate off the present southern breakwater. This will mean an extension of the northern breakwater and the construction of a new and longer southern breakwater which passes again into the curved mole joining the coast in a south-east direction with a wide curve and which determines the most westerly limitation of the extension scheme.

As it is essential for agricultural purposes to restrict the penetration of salt water as much as possible, a direct connection between the deep water basin and the adjacent agricultural area was considered undesirable. To that end, the canals for inland navigation (4) are to be kept clear of the deep water basins or, if linked, will be provided with sets of locks spaced at a good distance from each other; whilst the Brielse Maas (8), now an artificial fresh water basin, must be kept intact.

At the northern side, the "Nieuwe Waterweg" forms the natural boundary, at the southern side the boundary is determined by the above mentioned fresh water lake. This fresh water reservoir (9) was created by closing its link with the Nieuwe Maas named Botlek and by laying a dam in the mouth of the Brielse Maas—originally one of the outlets of the Rhine—near the sea (10). To ensure accessibility and to provide a new fresh water intake a canal called Hartel canal was dug running south of the Botlek area (11) and connected with the Oude Maas by a set of locks. To substitute the original outlet into the sea at the western end in the canal connecting the Brielse Maas with the Nieuwe Waterweg a dewatering sluice was built in order to evacuate the surplus water.

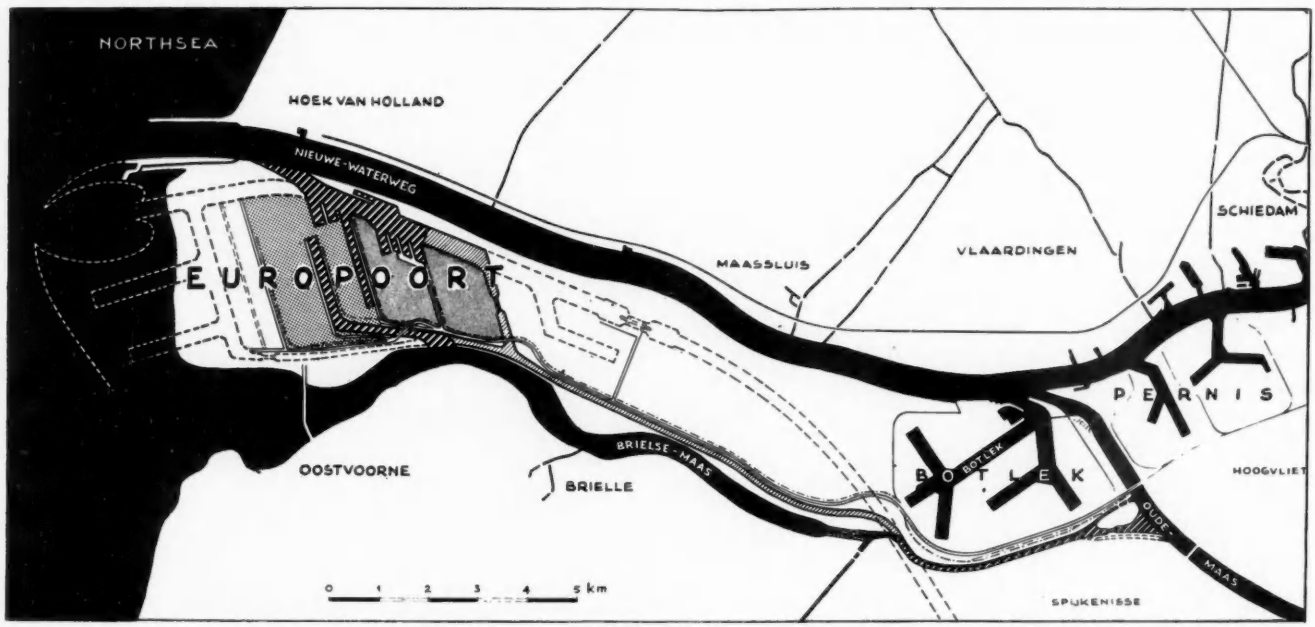


Fig. 11.

In this way, a kind of lake was created serving as fresh water supply for agricultural purposes and offering good possibilities for recreation. The proximity of such a basin was considered of great importance to the future of the Europoort scheme as it would also ensure a supply of fresh water for industrial expansion.

At its eastern end the new extension scheme will be linked up with the already existing Botlek area, by-passing the village of Rozenburg is the only inhabited part of the entire area, whilst at the western side the sea sets a limit to the possibilities.

With all these requirements in mind, a plan was conceived within the geographical frame outlined above with the object of providing facilities for oil terminals, for ore and coal stockpiling, and for steel mills and blast furnaces.

A deep canal called the Europe seaway with a width of 1235-ft. (7) runs straight from the new entrance parallel and close to the Nieuwe Waterweg to the eastern end of this area and acts as a main artery making the whole area covered by this plan accessible to all kinds of sea-going ships. In order to provide good communication with the hinterland for inland shipping, a "lateral canal" was designed just north of the Brielse Maas lake. Beyond the eastern end of this area, this canal will proceed with a curve further eastward joining up with the existing Hartel canal (11), which will be partly widened and will be given a new access from the Oude Maas by locks (5) of such dimensions that any type of inland craft (including pushboats—which are becoming a more and more popular means of conveyance on the Rhine) can pass with the minimum of delay. The safeguarding of the fresh water supply to the Brielse Maas necessitates a special intake (12) running south of the eastern part of the inland shipping canal. To restrict too much loss of land, a bend at the western end of the Brielse Maas lake (13) will be incorporated in the Lateral

NUMBER OF SHIPS ENTERED THE PORT OF ROTTERDAM WITH A DRAUGHT OF 10.50M. (34'5") AND MORE

DIEPGANG	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
10.50 - 10.59 (34'5" - 34'9")	9	10	16	16	12	34	55	37	75	64	90
10.60 - 10.69 (34'9" - 35'1")	2	5	8	4	7	7	28	54	84	82	93
10.70 - 10.79 (35'1" - 35'5")	1	6	8	5	12	21	17	10	22	37	54
10.80 - 10.89 (35'5" - 35'9")			1	1	3	4	26	17	29	48	95
10.90 - 10.99 (35'9" - 36'1")			1			1	6	11	16	38	62
11.00 - 11.09 (36'1" - 36'5")			1				6	8	4	6	13
11.10 - 11.19 (36'5" - 36'8")								6	7	8	7
11.20 - 11.29 (36'8" - 37')								4	3	14	15
11.30 - 11.39 (37' - 37'4")								1	1	2	10
11.40 - 11.49 (37'4" - 37'8")								2	1	7	8
11.50 - 11.59 (37'8" - 38')										8	14
11.60 - 11.69 (38' - 38'4")										1	2
11.70 - 11.79 (38'4" - 38'7")										-	1
11.80 - 11.89 (38'9" - 39')										3	3
11.90 - 11.99 (39' - 39'4")										1	-
TOTAAL	12	21	34	26	34	67	136	150	240	309	467

Fig. 12.

Canal by making a kind of cut-off whilst the former bend will be completely shut off from the Brielse Maas lake by two dams. Westwards the Lateral Canal passes into an inner harbour which will serve the adjacent sites with a direct shipping communication with the hinterland.

Connecting with the existing road-and railway system serving the Botlek area, a system of a main road and railway tracks is designed north of the Lateral Canal (14). In the east, these main traffic lines will cross the sea canal by high level bridges having movable spans (15) to permit the passage of sea-going ships, whilst the plan also takes into consideration a possible further improvement which would replace the road bridge by a tunnel. In the west, these traffic lines will cross the Lateral Canal (16) by fixed bridges at such a level that all inland craft as well as floating derricks with lowered legs will be able to pass underneath. Also, where necessary, side-lines will branch off these main roads and railways in a northerly direction to serve the industrial areas.

Initially, the idea of Europoort was solely based on the creation of an oil terminal accessible to the largest tankers. With the coming into operation of big ore carriers, however, it was decided to incorporate in the plan provision for the establishment of modern ore and coal discharging and storage facilities. Moreover, in view of the expected increase in steel consumption, and in view of the favourable location and the excellent subsoil conditions, it was considered justified to provide for the possibility of establishing blast furnaces and steel works.

The master plan drawn up in 1957, and accepted with a few minor modifications soon afterwards, is now being carried out accordingly. As indicated in Fig. 14, the site marked (1) is allocated for the steel industry with a possible extension to the west of the area. The site marked (2) is destined for ore storage, and is bordered at the eastern side by the Ore Harbour, with a depth of at least 49-ft. and a width of 900-ft. enabling the ore-carriers to unload in the shortest possible time. The loading of inland craft and pushboats will take place at the western side of the inland harbour which links up with the Lateral Canal and will

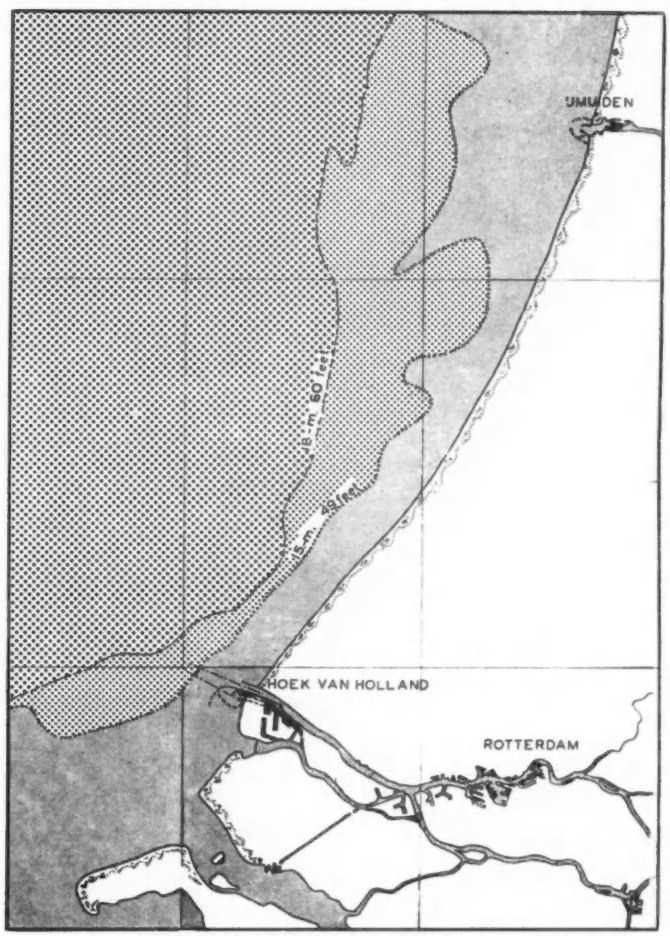


Fig. 13.

serve both the ore stock piling yards and the steel plant. The area marked (3) is reserved for oil terminals and compromises, in the first stage, two basins for berthing the tankers. The design and building of the jetties is undertaken by the private companies to whom the sites are let. East of this area sites for oil terminals will be prepared according to the detailed demands of the applicants. From this oil area, a pipeline consisting of 2 pipes of 24-ft. diameter runs across the Europoort sea canal and along its northern bank to Pernis where it joins the pipe line to the German refineries in the Ruhr area. The latter pipeline is operated by a private company set up by a number of oil companies.

The Rotterdam Ruhr Pipeline has a length of about 180 miles, and it is expected that the initial capacity of 5 million tons per annum will be gradually increased to 20 million tons. South of the oil terminals in the western section of the Brielse Maas,

berths will be built for loading inland tankers, whilst its spacious water area will afford ample accommodation for waiting inland tankers and other craft.

Just north of the stock piling yards is located the temporary entrance. Corresponding to the preliminary restriction of the draught of the vessels to 42-ft. 6-in. the sea canal (called the Europe-Seaway) and the tanker basins have at the outset, depth of only 43-ft. at lowest low water, thus admitting tankers of some 70,000 d.w.t. as soon as the depth of the present entrance can be increased, still larger tankers will be able to enter and when the permanent entrance has been completed—having a depth, according to the demands of at least 50-ft. vessels of from 100,000 to 130,000 d.w.t. will be able to reach the Europoort basins.

Execution of the Programme

It is obvious that such an extensive development scheme as the Europoort-plan must be carried out in stages. Stage 1 comprises the sites indicated with 1, 2 and 3 (Fig. 14), the western part of which, including the temporary entrance, was completed by the end of last year so that the first tanker was able to discharge its oil. The eastern part of Stage 1 which will be completed by the end of this year also includes the construction of the final connections with the hinterland by road and by water.

During Stage II the sites east of the area of Stage 1 will be reclaimed, by working gradually from the western as well as from the eastern direction, thus shaping an extension of both the oil terminal area and the industrial centre of the Botlek. When, therefore, within a couple of years this "gap" will be filled, the Europoort area and the Botlek area will form one continuous stretch of industrial land. At the same time Stage II will include the building of both breakwaters at the entrance and the front mole which runs southward in a wide curve joining the coast as well as levelling part of the dune area between the site marked (1) and the existing coastline. In Stage III the dredging of the permanent entrance and the works in the sea area between the front mole and the present coastline will be carried out.

In view of the wide scope of the scheme and the urgency to operate in the shortest possible time part of the Europoort as a terminal for oil tankers, it was necessary to start the works on a large scale. A favourable circumstance was that within a few years heavy dredging material would be needed for the execution of the Delta-works. Based on long term demands it proved justified at that time to build new equipment specially adapted for this kind of work, which, added to the existing dredging fleet, made it possible to achieve a great output at a very low cost.

Stage 1 comprises an area of 3,875 acres gross, of which 1,07[illegible] acres were excavated to admit water whilst 2,800 acres had t[illegible] be filled up to 5.50-m. ± N.A.P. (Datum), involving the removal o[illegible] 47,000,000 cu.m. of soil. To make the work as easy as possible, the dredging was carried out within the existing dikes, where the tide had no influence. The water level was kept at a lower datum artificially which made it possible to undertake the cladding of the slopes in the dry. The break through to the Nieuwe Waterweg for the temporary entrance, therefore, had to take place after all dredging and filling works as well as the construction of the defence works had practically been completed. The need to get a part of Europoort in operation as soon as possible was one of the main reasons for carrying out the work in two sections. As soon as the western part amounting to 2,000 acres gross, with a water surface of 350 acres and a land surface of 1550 acres nett was nearly ready the temporary entrance was formed. By separating the western area from the eastern by means of a temporary dike, it was possible to carry out the work in the eastern section without tidal disturbance while enabling the tankers to use the western part.

Construction Details

The preliminary works started in June 1958. Besides building the necessary bunds and permanent dikes for which, in the western part, 2,500,000 cu.m. of ground was removed, it also meant the demolition of some 300 heavy concrete shelters. The dredging works began in September of that year and in August 1960 the works had so far progressed that the dredging of the temporary entrance could start, and in December 1960 the first tanker was able to berth in Europoort. The dredgers partly dredged their way in from the Brielse Maas to their working position or passed through an inlet temporarily built for this purpose.

In the eastern part, the equipment also had to enter through the water defence dyke, which was afterwards closed again.

For the western part 35,000,000 cu.m. of sand was dredged and used for hydraulic fill by means of bucket and suction dredgers. During the peak period of the work the weekly output of the bucket and suction dredgers averaged 550,000 cu.m. which is equal to the creation of an industrial site of about 25 acres.

The boundary between the eastern and western part was formed

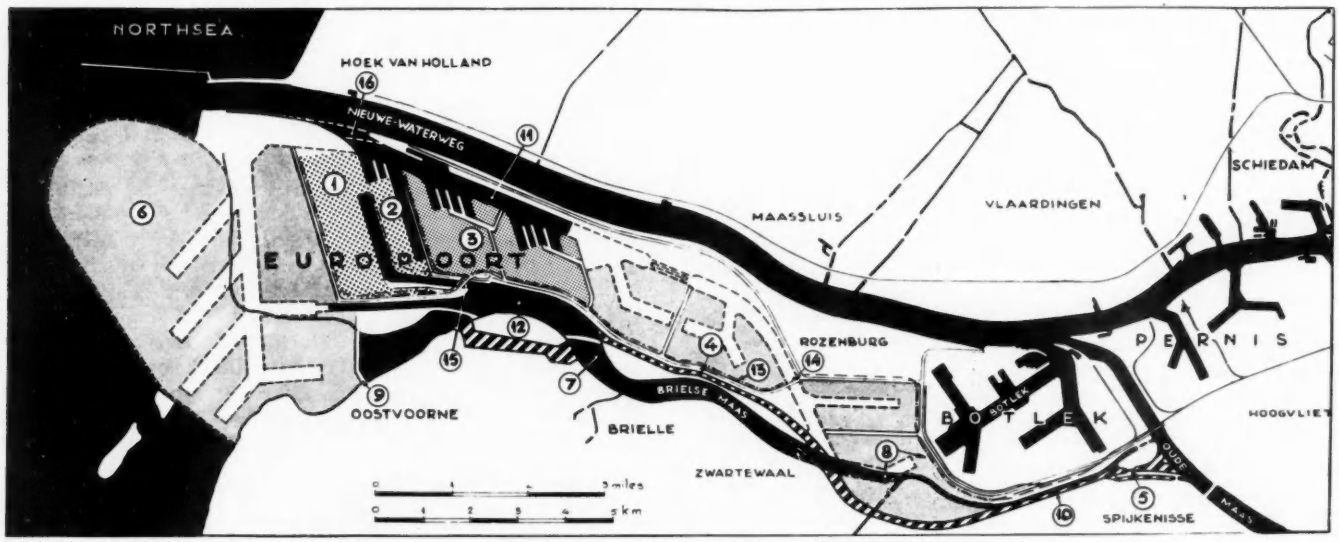


Fig. 14.

by the canal serving as an outlet for the superfluous water from the Brielse Maas into the Nieuwe Waterweg. This is also going to be filled in as soon as the new outlet with a pumping station, which is now under construction on the west side of the Brielse Maas, is completed. This outlet will have two access ducts and will serve both the Brielse Maas Lake and the Lateral Canal.

The French tanker "Sitala" 75,000 d.w.t. on her arrival in Europoort, 11th March, 1961.

As the reclaimed areas were raised by hydraulic fill, the work had to be carried out in such a way that the water was not drained off into the Brielse Maas lest the quality of the fresh water should be spoiled.

It is expected that a beginning will soon be made with Stage II of the scheme, both with regard to the reclamation works to the east of Rozenburg and the preparatory works for the new permanent entrance.

Although in addition to its obligations in other fields the carrying-out of the extension scheme described above means a heavy financial burden to the Municipality of Rotterdam, the costs of building the Botlek Harbour and Europoort are modest compared to the investments the private enterprises have to make. The cost of the Municipality of the work covered by Stage I of the scheme amounts to some 15 million Pounds Sterling, including the cost of acquiring the land. The cost of the entire Europoort project is estimated to total between 3 and 4 times this figure.

Conclusion

It cannot be denied that, in view of the fact that the resources available in a small country such as the Netherlands are relatively modest, the extension plans described look somewhat ambitious. There is, however, no reason for the onlookers to marvel nor for the Rotterdam citizens to boast since, apart from its favourable geographical location which is a gift of nature, the post-war development of Rotterdam would not have been so successful were it not for the rapid recovery of Western Europe and the growth of international prosperity.

Should there be reason for praise, then it should be given to those who have assiduously seized opportunities when they arose and to those bodies who have succeded in persuading all interests to co-operate in forging the many diversifying points of view into a comprehensive scheme.

Last but not least, should be mentioned the great efforts of all concerned from the conception of these plans until their realisation, and the understanding on the part of the landowners who gave up their homesteads for the benefit of the further industrialisation which is indispensable to the future of the entire Netherlands nation.

Pneumatic Breakwaters to Protect Dredgers

By Col. JAMES L. GREEN, F.ASCE.

A paper entitled "Pneumatic Breakwaters to Protect Dredges" by Col. James L. Green, Associate Professor of Civil Engineering at Princeton University and submitted to the American Society of Civil Engineers, has been received and an extended summary of it appears below. It describes a feasibility study of the use of pneumatic breakwaters to protect dredgers off the New Jersey shore from Sandy Hook to Manasquan Inlet. The paper is accompanied by a helpful bibliography, with brief notes on the principal studies that have been made on the subject and by tables of wave heights and lengths off the East Coast of the United States.

Description

The pneumatic breakwater consists of a submerged perforated pipe through which compressed air is forced. The pipe may be either suspended in the water or placed upon the ocean floor. As the compressed air is emitted into the water through the perforations, the air rises and a curtain of bubbles creates an upward motion of the air-water mixture. When this mixture reaches the surface, the air escapes while the flow of water branches out into two horizontal currents, one in the direction of the waves, and the other opposing them. The waves are reduced in height by a combination of the turbulence of the air-water mixture and the movement of the newly-created opposing current which causes premature breaking and consequent reduction in height and energy of the waves.

In the patented air distributor of Pneumatic Breakwaters Ltd., London, the air is released in intermittent bursts. It may be that this method of releasing the air increases the breakwater's efficiency when the water is shallower than half the wave length with the consequence that a good deal of the orbital wave motion in the water is near the bed, but the Company has not published data by which this suggestion might be checked.

Proposed Use

If pipeline dredgers could operate safely off shores exposed to the ocean, beach erosion might be restored by pumping ashore sand dredged from the sea bed a mile or so out and this facility would be of considerable benefit. In the Department of Civil Engineering of Princeton University, therefore, a study was made of the feasibility of using pneumatic breakwaters to protect dredgers operating within about one mile of the shore of New Jersey.

Three feet was assumed to be the greatest height of long ocean swells in which a pipeline dredger would be safe. For a pneumatic breakwater to be a practical protection it would have to be ensured that few if any waves of greater height would reach the dredger or the pipeline. The essence of the feasibility study therefore was to determine from the available data on the performance of pneumatic breakwaters whether they could furnish this degree of protection for sufficiently long periods to permit economical operations.

Effectiveness of the Pneumatic Breakwater

Since the pneumatic breakwater was first tried by Mr. Philip Brasher, an American engineer, in 1908, there have been several recorded trials of the method but precise information about its effectiveness is lacking. In more recent years laboratory experiments have supplied a good deal of data about the method but the factors for translating model horsepowers to full-scale requirements have not been fully established.

Nevertheless, taking the laboratory experiments as a whole, the following points have emerged clearly. First that the calming of long waves takes a great deal more air than short waves. Secondly, that much more air is required in shallow water than in deep water. Combining these two relations it is clear that the ratio between wave length and depth of water, L/d, is an important indicator of the difficulty of wave calming. It is clear also from the literature that wave calming to any valuable extent, say by 40% down to 60%, becomes increasingly difficult and perhaps impracticable when the L/d ratio rises above 4 or 5.

Wave Records

Analysis of the records of waves measured by the U.S. Beach Erosion Board, substantiated by similar records taken at the Monmouth Beach Lifeboat Station, New Jersey, gives a great deal of information which may be summarised by saying that for a little less than half the time the "significant" height of waves did not exceed 3-ft. and the L/d ratio was about 4. For rather more than half the time the "significant" wave was higher than 3-ft. and its L/d ratio was more than 4.

These significant waves have the same period as the predominating waves and a height that is the average of the higher one-third of the predominating waves. From records of wave heights the frequency of occurrence of waves higher than the "significant" height can be found. It is found that if the "significant" height is 2-ft., the waves will rise to above 3·4-ft. only in 1% of the time. With a "significant" height of 3-ft., the waves will exceed 4·8-ft. only for 1% of the time.

Effect of the Pneumatic Breakwater

A breakwater reducing these higher waves to the "significant" height would need to achieve a reduction or around 40% which is about the best reduction to be expected when L/d=4. It is therefore reasonable to conclude that when the "significant" wave height is no more than 2 or 3-ft. and the L/d ratio is 4 or less, the pneumatic breakwater might be expected to exclude from the protected area all but a few waves higher than the "significant" height. It may be concluded also that a reasonable indication of the breakwater's potential value would be the percentage of the time when the "significant" wave is 3-ft. or less and L/d is 4 or less.

The hours of occurrence of calm sea, or of waves of "significant" heights of up to 3-ft., were of course not all consecutive. The dredging operations would therefore probably require the protection of a breakwater even during calm hours as insurance against sudden swells. This being the case, the breakwater would be of some value for nearly half the time. However, its value is dependent upon an ability to take advantage of the hours of calm or of relatively low swells and to remove the equipment to safety during periods of high swells. Even during the months when the waves are lowest, the statistics show many hours when waves do occur that the breakwater cannot be expected to reduce to acceptable heights, and some of these hours may occur at any time. Consequently, operations would be likely to suffer interruptions and damage to the equipment unless there were a reliable service to warn of approaching high swells. For these reasons, it does not seem that the breakwater is likely to be of practical advantage to dredging operations off the New Jersey shore unless it can be improved to the point where it will reduce to 2 or 3-ft. not only waves in low ranges of "signficant" height but also the great majority of all waves which are likely to occur during extended periods.

The pneumatic breakwater in its present state of development could not be expected to reach this standard for a little more than half the time througout the year, but during the months June/July/August the inadequacy would be for only about a quarter of the time.

Multiple Breakwaters

Since the single breakwater does not appear able to ensure uninterrupted safe operations during the most favourable months, the possibility of using multiple breakwaters was considered.

If the breakwater could be improved to effect 40 to 50% attenuations at L/d ratios up to about 20, it could have better possibilities. Two or three breakwaters might be placed across the path of the incoming waves, the breakwaters being separated by enough distance, say a thousand feet or more, to act separately. If each of these breakwaters attenuated a 12-ft. wave by 40% it would be only 2·6-ft. high after passing the last one. However, with present prospects of only 15% or less attenuation at best, the wave would most likely not be reduced by three breakwaters to a height below 7·5-ft.

If pneumatic breakwater equipment were readily mobile it could not only be placed in the form of successive breakwaters, each attenuating the oncoming waves, but it could also be moved to new locations as the direction of the waves shifted, and the length and alignment of each breakwater could be altered as needed to lessen diffraction around the ends. For the lower waves only one breakwater might suffice, and with all equipment controlled from a central location the second and third breakwaters could be operated only when needed. Similarly the air supply could be regulated to furnish only as much as required, with the full capacity needed only for the high L/d ratios.

Conclusion

However, it appears that in any event a large amount of equipment would be required for dredging operations exposed directly to ocean waves. Dredgers able to operate in higher swells than at present would demand less protection from the breakwater. It must thus be concluded that the pneumatic breakwater equipment in its present state of development cannot furnish reasonable protection to conventional pipeline dredging equipment in areas within one mile of the New Jersey shore.

Passenger Terminal at the Port of Auckland

To meet the increasing passenger and tourist traffic through the Port of Auckland, New Zealand, the Harbour Board has developed the eastern berth of Princes Wharf as a passenger-cargo facility. Although this berth has been used for passenger traffic, the difficulties encountered in handling large numbers of passengers and their luggage through cargo transit sheds has proved a serious problem. The cargo sheds have now been adapted and the interior redesigned, at a cost of £100,000, as a reception terminal.

Princes Wharf was found to be admirably suited for adaptation, and being a flat-roofed construction of reinforced concrete, required comparatively little alteration to permit a car park for 150 vehicles and a special viewing area to be constructed on the roof. Vehicle access to this area is by a ramp constructed from deck level through the south end of the shed at the head of the wharf, while pedestrian access is by stairway at the same point. Wharf sheds have been connected by pre-stressed concrete bridges giving room for two-way vehicular traffic on the roof. The ground floor is used for baggage and Customs.

Some Notes on the Electrical Requirements of General Cargo Docks

By E. R. RADWAY, C.G.I.A., M.I.Mech.E., M.I.E.E., M.I.Struct.E.
Mechanical and Electrical Engineer, South Wales Docks
(British Transport Commission)

SUMMARY

This paper, which is written with special reference to the South Wales ports, outlines the function of a general cargo dock and the effect of grouping such docks into a port system; its object is the stimulation of thought and discussion on the improvement of electrical engineering in the dock industry.

The paper, which is being printed in 2 parts, illustrates and comments on the electrical supply and distribution practices of the industry, the electrical features of the pumping plant used for hydraulic power production and impounding services, the requirements for tenants and the safety of shipping, and it discusses some of the problems associated with the mechanical handling plant.

Passenger reception and handling peculiar to the liner terminal ports, and the electrical installation of ships, are outside the scope of the paper.

INTRODUCTION

A dock provides a safe anchorage in conjunction with rail and road heads having storage accommodation and mechanical facilities for efficient cargo handling. It may be an open dock subject to tidal variation, an enclosed tidal dock requiring lock entrances or an enclosed impounded dock requiring both lock entrances and pumping plant to maintain its water level. Where such docks exist in close proximity to one another, they have tended to form a port system, giving a stronger financial structure, standardisation of plant and flexibility to meet peak demands by the transfer of mobile plant, so enabling a professional staff to be engaged continuously on development and maintenance and justifying capital investment on base workshop facilities.

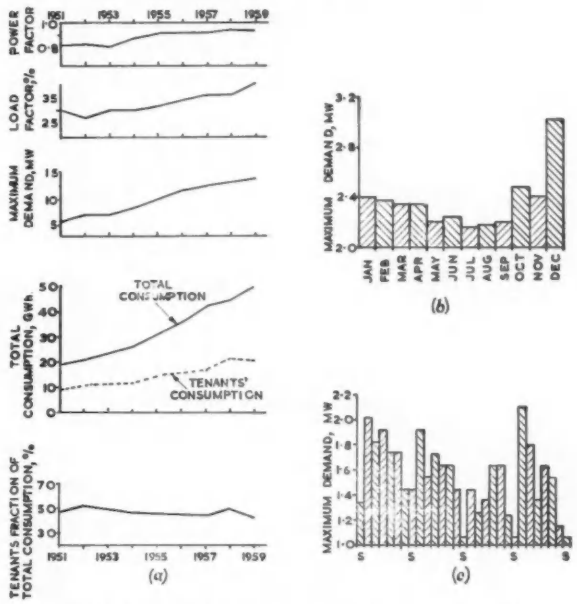
POWER SUPPLY AND DISTRIBUTION

The dock authority needs an electrical supply and distribution system for its quayside facilities and pumping stations, and is often the electricity supply authority for the many tenants occupying the extensive dock estates. These requirements necessitate 6·6 or 11 kV distribution. Private generating plant is not an economic solution, so that bulk supplies are obtained from the Electricity Boards and are invoiced on the published maximum-demand tariffs, having load-factor and power-factor features; no preferential treatment is offered, notwithstanding the elimination of Electricty Board capital in supplying to dock tenants. Dock authorities usually offer their tenants such published tariffs, relying on maximum-demand diversities and the magnitude of the load to give a financial working margin. Fig. 1 shows the electrical loading trend of five major ports handling $18\text{-}25\times10^6$ tons annually, and also the typical monthly and daily demand curves of a port.

Factors Affecting the Design of the Electrical Distribution System

The designer of a dock electrical distribution system must understand that

(a) The load factor is lower than continuously working process plant, but supply is required 24 hours per day for seven days per week.
(b) Certain parts of the system are vital.
(c) The types of load and load factor of tenants and dock machinery vary widely, as exemplified in Table 1.



(a) Growth of consumption, maximum demand, load and power factors.
(b) Monthly maximum demand.
(c) Daily maximum demand (S = Sunday).

Fig. 1. Electrical load at the South Wales docks.

Table 1. Typical Dock Loads

Installation		Installed capacity	Maximum demand	Load factor	Diversity factor	Remarks
		kW	kW	%	%	
Dry dock and ship repairing firms	A	1 400	260	20	18·6	
	B	440	100	20	22·7	Workshop machinery; no pumping plant
	C	800	260	26	32·5	
	D	2 400	350	18	14·6	
	E	2 500	800	18	32	
	F	1 000	300	15	30	Workshop machinery; including pumping plant
	G	1 500	600	12	40	
F and G (summated)		2 500	830	14	33·3	
	H	650	140	16	21·6	Repairs afloat
	I	260	75	12	28·9	
Board mills		3 150	1 500	45	48	From dock network; restricted peak period m.d.
			500		16	From consumer's generator set
Flour mills	A	1 100	708	61	64	Mill only
	B	2 400	1 350	43	56	Mill with pneumatic intake plant
	C	3 800	2 023	36	53	
	D	3 195	1 750	43	55	Mill with pneumatic intake plant and provender section
Cold stores		806	218	58	27	
Briquette works ..		2 000	935	54	46·5	
Sawmills	A	380	38	10	10	
	B	361	114	14	32	
	C	162	51	5	32	
Oil-tank farm		176	80	16	45	
Hydraulic pressure pumping station		1 008	655	54	65	
Impounding station ..		900	578	21	64	Also used for dry-dock pumping
Combined hydraulic and impounding station		1 280	1 061	13	83	
Dry-dock pumps ..		478	478	3	100	

Paper presented at the Institution of Electrical Engineers, London, in February 1961, and reproduced by kind permission.

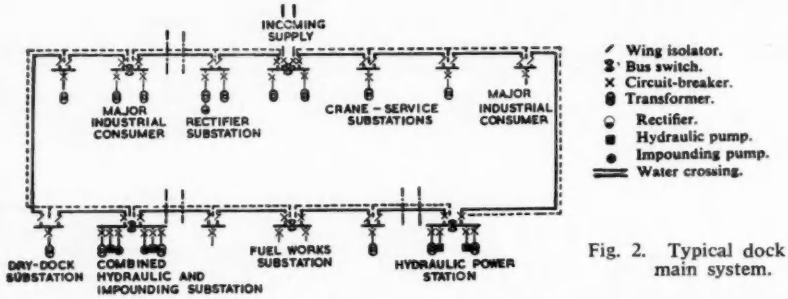


Fig. 2. Typical dock ring-main system.

Intake voltage	Length	Transformer rating		Design rating	Transformer power / Design power	Number of substations	Substations per 1000 yd	Protection
		415-volt	3·3 kV					
kV	yd ×10³	MVA	MVA	MVA				
11	8·1	8·25	6	5·5	2·6	13	1·62	Inverse time
6·6	3·1	2·5	1	3·75	0·93	5	1·62	Inverse time
66	6·25	3·5	5	5·5	0·73	13	2·07	Pilot
11	8·35	4·5	5	5·5	1·7	15	1·8	Pilot
11	6·2	2·35	3·4	3·9	1·4	6	0·97	Inverse time

(d) Water crossings, sometimes preventing easy access to substations, will be met.

(e) There are intermittent but substantial demands at many places, necessitating a larger number of substations per 1,000 yd than usual, giving a high ratio of transformer capacity to system maximum demand.

(f) Cables must be used for the h.v. supply, but l.v. overhead distribution may be a satisfactory economic solution for some areas of the estate.

Main Distribution System

Where dock electrical systems involve water passages, the distribution should be a ring, both physically and electrically. Fig. 2 shows a 6·6 kV application with pilot protection, and gives data for several installations. The hydraulic power station and a tenant operating a continuous process are considered as the points for discriminatory protection. Craneage quays and minor substations are supplied via ring-main oil circuit-breakers and isolator units, with single transformers and shunt-trip fuse protection. Failures of such equipment are so few that the extra cost of transformer duplication and discriminating protection for such substations is unjustified. For smaller dock systems with a fault clearance time of at least 1 sec., inverse-time protection is satisfactory.

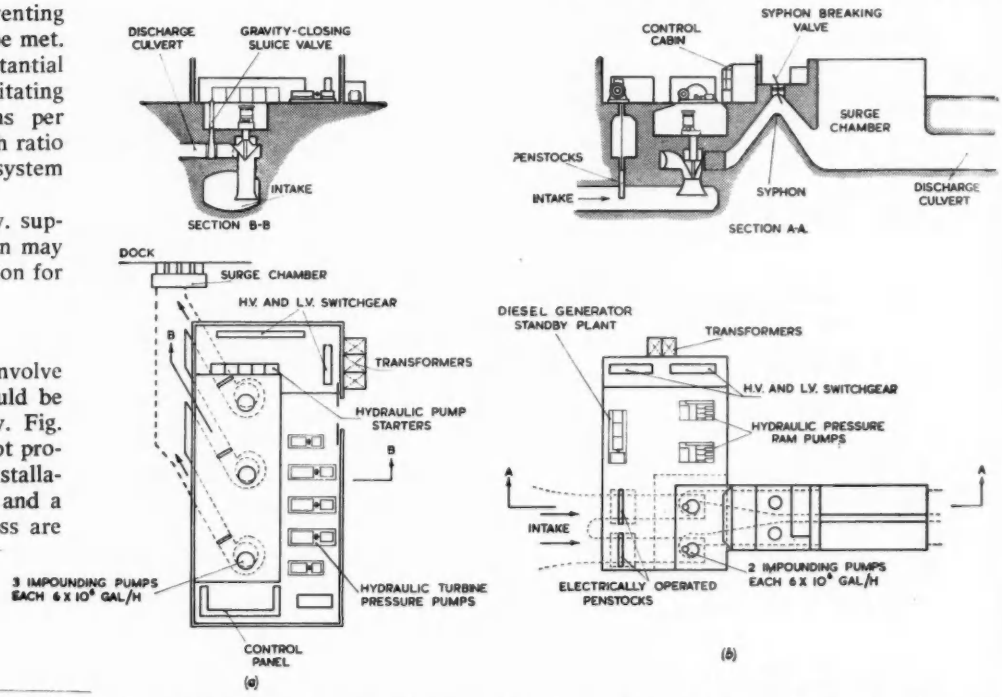


Fig. 3. Arrangements of typical hydraulic and impounding pumping stations.
(a) Station converted from steam to electric operation.
(b) Station of new design.

Substations, Switchgear and Transformers

The materials and methods of general supply and distribution practice are satisfactory; 250 MVA at 11 or 6·6 kV usually meets the fault ratings of the supply, and air-insulated busbar h.v. switchgear of the vertical-isolation horizontal-draw-out type is suitable. The merit of air-insulated in comparison with compound-filled busbars is supported by the excellent record of air-insulated truck-type horizontal isolation gear installed from 1920 onwards.

Experience with modern equipment confirms this view. Oil circuit-breakers for lines of above 300 amp capacity and h.r.c. fuses for circuits below 300 amp give satisfaction on the low-voltage services. Transformers should be suitable for either indoor or outdoor service, and the number of sizes should be kept to a minimum; with an 11 kV supply, 250, 500 and 750 kVA transformers with 433-volt secondaries are customary for dockside distribution, and 2 MVA units with 3·3 kV secondaries for pumping stations. Buchholtz relays or winding-temperature-recording devices are unnecessary, but silica gel breathers are usual on all transformers and conservators on those above 750 kVA at 11 kV.

Cables

The numerous underground services, old foundations and various types of filling encountered, together with the many rail, road and water crossings, make cable-laying conditions difficult. Single-wire-armoured and served cables are used for the general laying, and double-wired-armoured non-draining types having double servings are used for the water crossings.

Direct laying in sand with cover tiles at a depth of 2-ft. is generally satisfactory; for road crossings, conduit surrounded with concrete laid a a clear depth of 3-ft. is acceptable, but for rail crossings the depth is increased to 4-ft. and the conduits are extended at least 4-ft. from the edge of the nearest rail to avoid damage from the hammering of passing rail traffic.

At water crossings, either a culvert or a wall chase is provided at the construction stage. The culvert is best for installation and maintenance, but its first cost is high and the chase is more often met. Separate chases should be used for the electrical services, to prevent cable damage and supply interruptions due to repairs of other services.

The cable should be cleated down the vertical chase at about 3-ft. intervals and dressed down into a horizontal chase, to avoid disturbance when sluicing, emptying

or filling the locks. To avoid joint strain, a clamping anchorage is necessary at each side of a water crossing when neither culvert nor chase is provided.

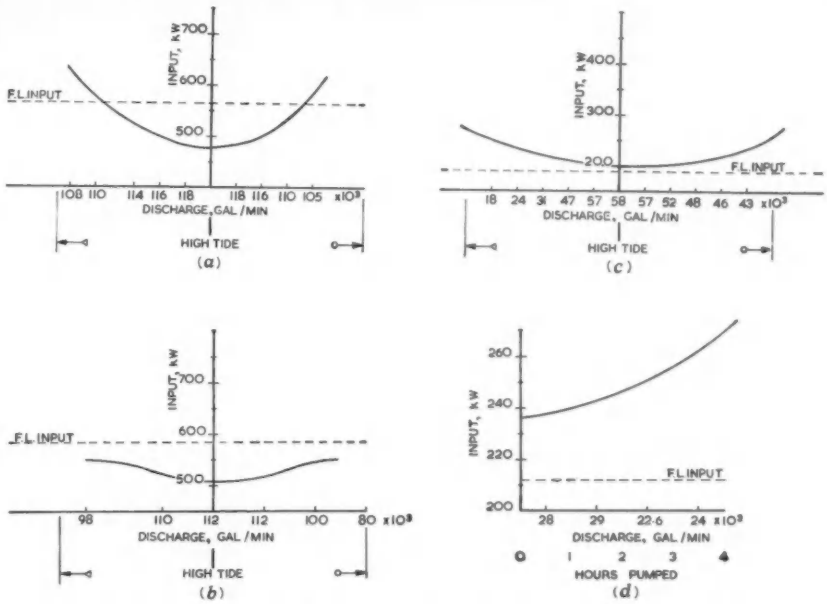
Power Factor

With the transformer capacities, maximum demand and load factors indicated in Figs. 1 and 2, and with the tenants' power factors under penalty at not less than 0·85 lagging, the overall dock power factor can be maintained between 0·92 and 0·97 lagging by connecting, without automatic control, capacitance of approximately 5% less than the total connected transformer reactance.

ELECTRICAL REQUIREMENTS OF PUMPING PLANT

In addition to those required for dry-dock operation, pumps are needed for impounding and hydraulic power services; for minimum operating and capital costs, if both types are required, they should be in one station.

Fig. 3 shows the conversion of a steam-operated station having design restrictions of the existing impounding suction and delivery culverts which necessitate the use of a gravity-closing sluice valve and providing hydraulic power for general dock use. It also illustrates a new installation of advanced design, the gravity-closing sluice valve being replaced by a syphon ; small electrically driven hydraulic-pressure ram pumps of sufficient capacity for the lock equipment only are provided. Operation of the lock machinery and lighting is safeguarded against mains failure by the automatic starting of a diesel-driven generator set.



(*a*) High-speed mixed-flow pump; maximum stator temperature = 50°C, ambient temperature = 18°C.
(*b*) Low-speed mixed-flow pump; maximum stator temperature = 57·5°C, ambient temperature = 16°C.
(*c*) Axial-flow pump; maximum stator temperature = 69·5°C, ambient temperature = 13°C.
(*d*) Centrifugal pump; maximum stator temperature = 67°C, ambient temperature = 20·5°C.
The arrows denote the periods 3 hours before and after high tide.

Fig. 4. Characteristics of impounding pumps.

Impounding Pumping Plant

Motors

An impounding pump motor runs for about six hours against a varying hydraulic head, and the mixed-flow propeller pump now in general use enables a constant-speed motor to be used efficiently for this duty. Drip-proof slip-ring induction motors were used for many years, but the capacity of modern distribution systems enables on-line squirrel-cage motors of about 700 h.p. at 3·3 or 6·6 kV running up to speed in 4 sec. with starting currents of 3-3½ times full load to be switched direct by an oil circuit-breaker, so reducing both capital and maintenance costs. A trend towards the use of vertical pumps has been noted, necessitating vertical motors with ball and roller bearings. Results obtained with this construction have been satisfactory.

The design speed of impounding pumps for from 6 to $3\frac{1}{2}\times10^6$ gal/hour ranges from 120 to 340 r.p.m. With the higher speed pump the motor may be of the direct-coupled low-speed type, but for the low-speed machine a motor speed of 750 r.p.m. driving the pump through a reduction gearbox is the economic solution. Continuously rated machines are used, thus enabling overloads to be accepted safely for part of the duty cycle (Fig. 4) if design conditions, test results or changing dock demands make it necessary.

Motor protection is by means of thermal-overload relays with phase-failure, overload, short-circuit and earth-fault features.

If the overload conditions exceed those permissible, the difficulty may be overcome effectively by using a slip-ring induction motor driving through a scoop-controlled fluid coupling so arranged that, as the induction motor reaches its full load under the varying head conditions, the scoop is operated by a torque motor to reduce the speed and output of the pump. Maintenance troubles with such a scheme operated since 1936 have been few.

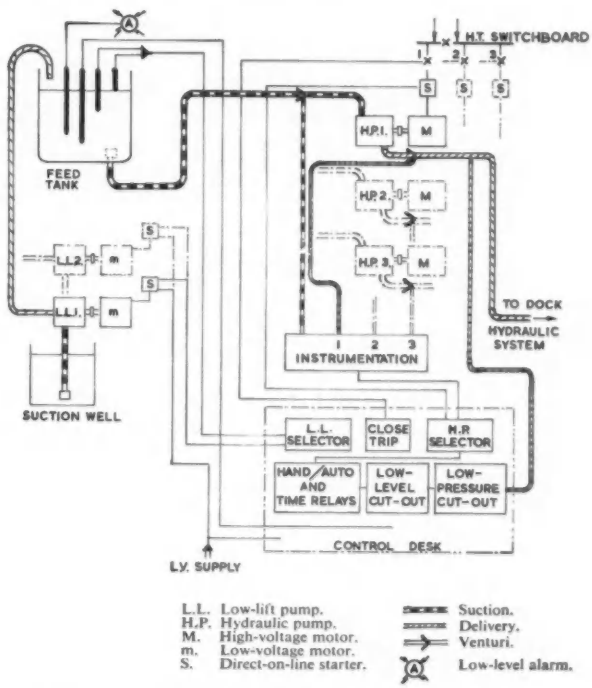


Fig. 5. Operating sequence in hydraulic pumping station.

Switchgear

Direct switching of the impounding pump motors by remote

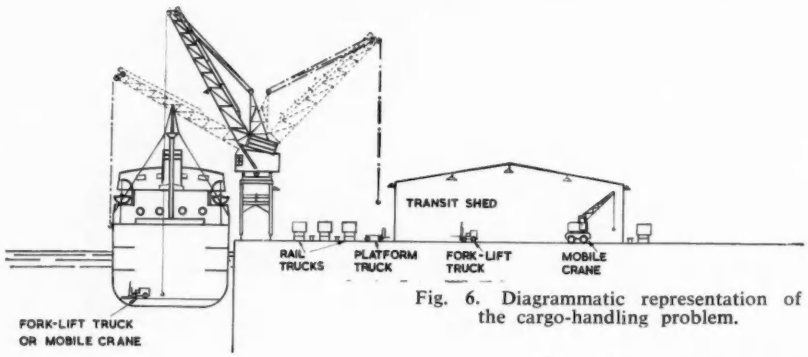
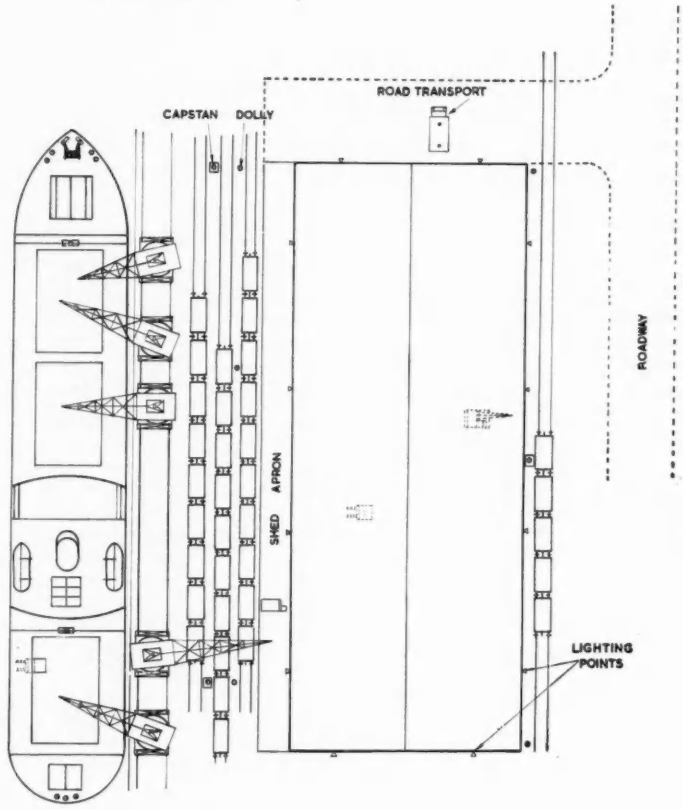


Fig. 6. Diagrammatic representation of the cargo-handling problem.



control of solenoid-operated 3·3 or 6·6 kV vertical-isolation horizontal-drawout oil circuit-breakers has proved satisfactory. Examination of the circuit-breaker contacts after 1,000 operations has indicated no signs of burning, but carbonisation of the oil occurs, necessitating an oil change after about 250 operations.

Hydraulic Pressure Plant

Hydraulic pressure supply requires pumping speeds of between 50 and 800 gal/min at 850 lb/in². Ram pumps can be used up to 250 gal/min, but the turbine pumps are preferably above this. Automatically controlled low-head pumps supply water to the suction tank where return-water systems do not exist.

Motors

The application of turbine pumps to hydraulic pressure duty necessitates direct coupling of the pump and motor. High-voltage slip-ring motors of up to about 650 b.h.p. at 1,460 r.p.m. have been the accepted practice, but recent developments require smaller turbine pumps running at 2,950 r.p.m. for greater flexibility of control, higher efficiency and minimum cost; 2,950 r.p.m. slip-ring machines are in use, but continuously rated squirrel-cage machines should be used if supply conditions permit, thus eliminating brush and slip-ring maintenance. Experience with squirrel-cage machines has been excellent, but the fluctuating hydraulic demand necessitates frequent starting and stopping, and critical design conditions may be met.

Low-lift pump motors are 10-30 h.p. 750 r.p.m. squirrel-cage machines and pose no problems. Past practice for ram-pump drives has been continuously running slip-ring motors, with the water by-passed by a hydraulic accumulator-actuated solenoid-operated diverting valve at times of low demand. Recent developments have been the use of direct-on-line-started squirrel-cage motors driving through scoop-controlled fluid couplings, giving light-load starting conditions and pump-speed control from the accumulator position. Under no-load conditions the light-running motor closes down after a period governed by a relay setting.

Control and Protection

Two methods of control have been developed for the electrically driven turbine pumps applied to hydraulic pressure supply. One method uses the movement of the accumulator to switch the pump on and off, but has the inherent disadvantage of possibly shutting off the pump when a heavy hydraulic demand might require its immediate restarting. The other well-proved method uses the water demand as the controlling feature, suitable relays being actuated by the head variation caused by the flow through the suction-main Venturi meter. This method failed when attempted in 1925: sudden surges in the main caused the slip-ring

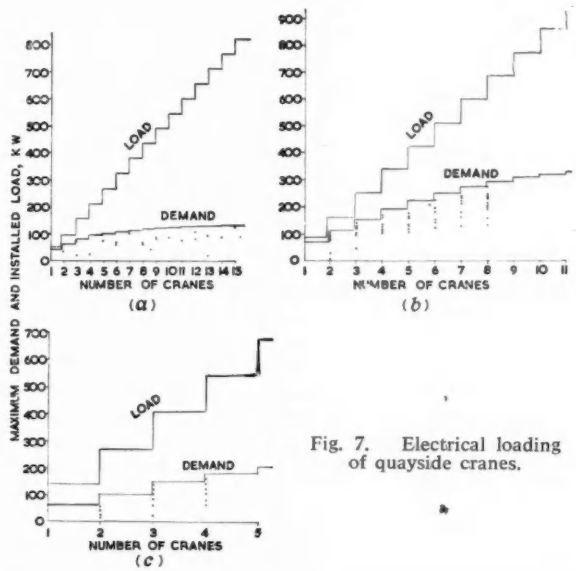


Fig. 7. Electrical loading of quayside cranes.

Fig.	Crane		Motor power			Commodity	Consumption	
	Capacity	Control	Hoist	Luff	Slew		Variation	Average
	Tons		h.p.	h.p.	h.p.		kWh/ton	kWh/ton
(*a*)	3 and 6/3	Rotor resistance	55	12	6	General cargo	0·2–1·4	0·43
(*b*)	6/3	Opposed torque	85	17·5	12	General cargo	1·2–5·1	2·55
(*c*)	10	Counter current	75×2	20	15	Iron ore	0·3–0·5	0·41

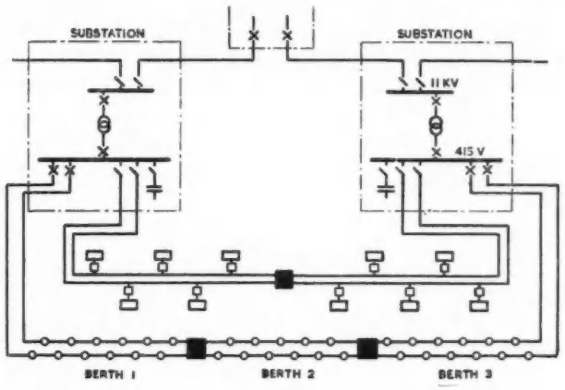


Fig. 8. Electricity supply to quayside capstans and crane plugs.

pump motors to start up one after the other before the previous motor in the sequence reached pumping speed, the hunting being aggravated by the large pump sizes then in use.

With the use of high-speed squirrel-cage machines necessitating limitations of the starting duty to about 12 starts an hour, the control scheme has been developed to take advantage of the pump's characteristic quantity/pressure variation used in conjunction with a hydraulic accumulator. An incoming relay with a delay setting of between 0 and 60 sec. is incorporated to prevent starting on a momentary surge, and a retaining relay with a setting of between 5 and 10 min. ensures that, when started, a pump will continue to run for the predetermined period, whatever the demand. The sequence and protection for such a hydraulic pumping installation are shown diagrammatically in Fig. 5.

Switchgear

The frequent starting and stopping of the hydraulic pump motors necessitates control by both oil circuit-breakers and air-break stator contactors. Oil circuit-breakers, fitted with under-voltage release, arranged for remote solenoid closing and d.c. shunt tripping and having combined thermal and attracted-armature relays to protect against overload, single-phasing, earth faults and short-circuits, control the supply, and air-break stator contactors with h.r.c. back-up protection, interlocked with their respective circuit-breakers, perform the operating duty. No maintenance troubles have been experienced with this arrangement during several thousands of operations.

LOCK ENTRANCE MACHINERY

Lock-gate operation by hydraulically powered winch-and-chain gear for entrances less than 60-ft. wide and hydraulic piston mechanisms for 60-100-ft. entrances are usual, but the application of a squirrel-cage motor driving through a fluid coupling is satisfactory for chain-operated gates.

Attempts to apply an electric drive to the piston-and-connecting-rod system, although a more difficult problem, have been reasonably successful. One solution is to supply each gate machine by a variable-speed pump unit driven by an electric motor. An alternative method is to use a rack, actuated linearly by a pinion, driven electrically through a fluid coupling.

Hydraulic-powered gate machines fed by a hydraulic pipe ring around the lock give reliable service, which, if supplied by an electrically operated pumping plant with diesel-driven standby situated on the lock side, is an economic method and worthy of retention.

Table 2. Contact Resistance between Crane Wheel and Rail

Crane as found	Crane after moving	Variation in resistance	
		Increase	Decrease
ohms	ohms		
0·1	0·2	2 : 1	
0·1	11·5	115 : 1	
0·15	20·5	134 : 1	
0·25	14·0	56 : 1	
0·4	75·0	188 : 1	
0·6	19·0	32 : 1	
0·65	3·25	5 : 1	
0·9	0·2		5 : 1
1·25	25·0	20 : 1	
1·65	7·0	4 : 1	
1·85	0·9		2 : 1
2·1	4·5	2 : 1	
4·0	8·75	2 : 1	
4·5	10·0	2 : 1	
8·0	1·15		7 : 1
8·4	30·0	4 : 1	
9·0	0·35		26 : 1
12·5	1·55		8 : 1
13·0	30·0	2 : 1	
35·0	7·0		5 : 1

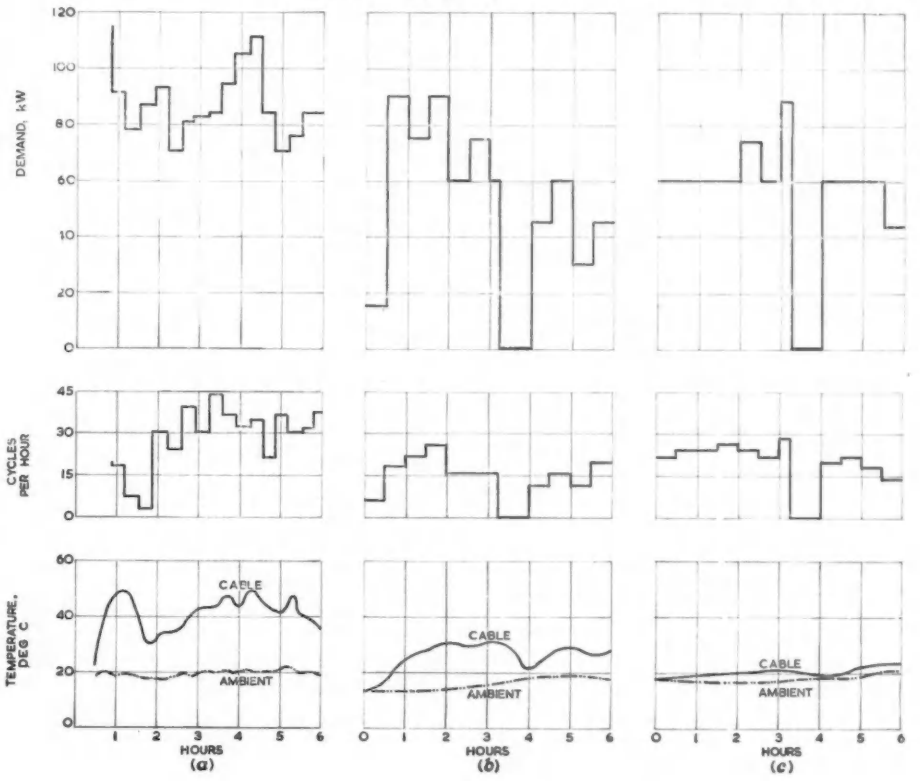


Fig. 9. Working temperatures of 4-core t.r.s. trailing cables.

Fig.	Crane capacity	Cable size	Hoist power	Type of control
	tons	in²	h.p.	
(a)	6/3	0·06	85	Opposed torque
(b)	10	0·06	2 × 75	Counter current
(c)	10	0·2	2 × 75	Counter current

Electrical Requirements of General Cargo Docks—continued

ELECTRICITY APPLIED TO THE MECHANICAL-HANDLING PROBLEMS

The mechanical-handling process involves the efficient unloading and loading of general cargo items of all shapes and weighing from a few hundredweights to many tons or bulk cargo, e.g. iron ore. With the exception of coal loading, where the hydraulically powered hoist forms a relatively efficient unit, modern practice is the use of electrical appliances; indeed, even for coal loading, electrically operated conveyors are beginning to replace the hydraulic hoists.

The mechanical-handling sequence (Fig. 6) requires fork-lift trucks, mobile cranes or angle dozers on the ship, high-pedestal high-speed large-radius level-luffing cranes on the quayside, adequate quayside road and rail services, and transfer sheds in which receiving, sorting, storing and loading to road or rail vehicles, by fork-lift trucks, mobile cranes or sack pilers is carried out. Capstans are often provided for small marshalling movements of the rail wagons.

Bulk cargo discharge utilises 4-line 10-ton-capacity grabbing cranes discharging to rail wagons; but if site conditions permit direct discharge to the user, specialised berths having ore unloaders or kangaroo cranes feeding by conveyor to the stockyards are adopted.

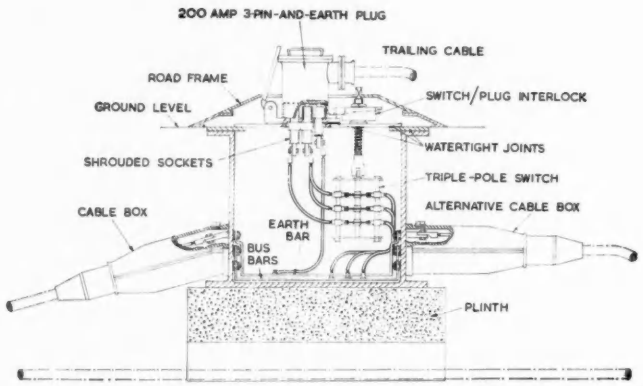


Fig. 10. Typical watertight ground socket and plug.

Electrical Distribution of Crane Quays

Although many docks retain the d.c. supplies of past practice and notwithstanding the advantages of d.c. crane control, economics preclude d.c. distribution for new quays and a.c. supplies have been established for many years. It is thus intended to discus a.c. supplies only. Crane-quay electrical loading conditions depend greatly upon the type of cargo being handled at any given time, but the tests (Fig. 7) taken on general-cargo and grabbing-crane berths handling a variety of different types of cargo give an assessment upon which crane-quay distribution may be safely based.

Sufficient security of primary supply for the crane quays is obtained from the h.v. mains by supplying via ring-main units, but the cables feeding the watertight plug boxes, which supply the cranes via flexible trailing cables, should be in duplicate at least, with the plug boxes arranged alternately on the cables (Fig. 8). Paper-insulated lead-covered steel-wire-armoured cables are used for this duty, and laying through ducts is necessary with built-up quays. In new quay construction a chase covered with removable concrete slabs, giving greater carrying capacity for given cable sizes and ease of installation or replacement, has much to commend it. If removable reinforced-concrete slabs laid on sand are used for the quay surface, direct laying in the ground is satisfactory.

Craneage requires a 415-volt 3-phase 3-wire supply, lighting and heating services usually being provided by a transformer installed on the crane to give a 110-volt output with the centre point earthed. Although the requirement is a 3-wire supply only, $3\frac{1}{2}$-core cable is to be preferred for the distribution system. The half-core gives the main earth continuity back to the substation independently of the lead and armouring of the cables, and such an arrangement with $3\frac{1}{2}$-core t.r.s. flexible cable between the plug box and the crane gives loop impedances between 0·006 and 0·26 ohm for little increase in cost.

An earth circuit via the crane wheels and rail track is not permissible, Table 2 recording the wide variation of rail-to-wheel contact which occurs.

From mechanical consideration the flexible cables should not be less than 0·04-in^2 in section; this size is applicable to 3-ton cranes, with cables of up to 0·2in^2 or more being used for the 6- and 10-ton cranes. Tests (Fig. 9) indicate, however, that 0·06in^2 cable is electrically adequate for the latter sizes.

Crane Plug-Boxes

The plug-box market is relatively small, making standardisation on one size desirable, and the 200 amp continuous rating is adequate. Apart from the trailing cable, plug boxes are the most vulnerable part of the crane supply system, for, in addition to normal weather hazards, quayside flooding by ship discharge—although forbidden—does sometimes happen. Experience dictates that a satisfactory plug box (Fig. 10) should:

(a) Be contained in a robust waterproof box, preferably of cast iron.
(b) Have the switchplug interlocked to prevent insertion or withdrawal of the plug from the socket unless the switch is in the off position.
(c) Have a robust switch-and-socket mechanism able to work for long periods without attention, but capable of easy replacement and isolation in the case of fault.
(d) Have plug sockets shrouded and watertight, to prevent short-circuits across the contacts with the plug box submerged.
(e) Have the interior of the cast-iron box treated with anti-condensation paint and the top cover sealed with a watertight joint.
(f) Not have fuses to protect the trailing cable in the plug box or plug top; the inconvenience and cost of replacing such h.r.c. fuses on their occasional failure are greater than the short delay of circuit-breaker reinstatement.

Few existing designs fulfil these requirements

(To be Continued)

New Port for Sarawak

A new port at Tanah Putch was officially opened early this month by the Govenor of Sarawak. The facilities already completed or under construction include a concrete wharf (800-ft. completed, giving accommodation for 3 vessels of up to 17-ft. 6-in. draft) godowns, warehouses and cranes.

Discharge of cargoes will normally be by ships' gear, but mobile cranes will also be available. Cargo will be palletised in the ship, discharged to trailers and towed by tractors to the godowns where it will be sorted and tallied before being stacked for delivery. For export cargo the reverse procedure will apply.

Under the new Port Authorities Ordinance, 1960, the port will come under the "Sarawak Port Authority" which will take over control from the Marine Department. It is understood that much more stringent security precautions will be enforced and it is hoped that the incidence of theft and damage by rough handling will be considerably reduced

Container Standardisation

An International Problem of Growing Importance

By E. S. TOOTH

Much thought is now being given to container traffic, not only by transport and handling organisations but also by container manufacturers, port authorities, cargo superintendents, Customs authorities, standardising organisations and even ship designers and government departments. The subject has recently become one of universal interest and, in nearly every case, the approach has been an enthusiastic one, a seeking of ways and means of making greater use of an efficient method of moving goods in unit load form. There have been articles, papers, discussions and symposia upon container construction, optimum sizes, handling methods, special containers, port to port operation, through transit operation (shipper to receiver), the attitude of labour, national and international standards, container pools, the economics of container operation and ship design. This growing traffic is presenting a complex picture.

Marine Traffic

Existing container traffic takes so many forms that the only way to present an understandable picture of it is to select samples. Containers are used for the complete through transit operation—a door-to-door service across land and sea—and for any segment of it. They are owned and operated by road and rail transport organisations, government departments, industrial organisations and shipping companies. They carry a huge variety of commodities and materials but the number of different sizes and types is disturbing.

The majority of containers are employed within national boundaries. Of the international traffic, only a small proportion involves sea transport and most of that appears in the short sea trades. The comparatively few in deep sea traffic are employed door-to-door as well as port-to-port. Many of these are American owned, those travelling inland generally being the property of industrial organisations or government departments, those employed port-to-port belonging to the shipping companies. They often carry special freight, such as the private effects of services' personnel and valuable and pilferable goods. Some are even used on deck as refrigerated space.

There is little uniformity of size. In the American trades, the types now commonly in use on conventional general cargo vessels vary from approximately 150 cu. ft. up to 800 cu. ft. in capacity and from approximately 5ft. to 20ft. in length. They are constructed from various materials, such as steel, aluminium, plywood and plywood with steel frames. Container Transport International Inc., for example, at the present time operate some 4,000 such general cargo containers on a world wide basis.

Containers recently inspected at deep sea berths on one day in the Port of London ranged in size from 4ft. x 4ft. x 6ft. long to 9ft. wide x 11ft. high x 21ft. long and had carrying capacities ranging from 50 cwts. to 10 tons. Preparations have been made in certain world ports for handling an increasing quantity of container traffic and developments are awaited with interest.

The short sea trade is a more "intimate" one, sellers in one country and buyers in another being more accessible to one another. It is thus easier to arrange door-to-door service, which therefore is greater in short sea and coastal trading than in deep sea routes. Containers regularly in service between the United Kingdom and north west Europe and Ireland are railway, roadway and shipping company owned, are of various types, including refrigerated, collapsible and wheeled, and have capacities from 200 cu. ft. to 680 cu. ft. and more. Some have pallet bases, most have lifting lugs. Common construction is of wood or metal or both.

Containers in the short sea routes are used for both general and special cargoes, the latter again usually being valuable and pilferable goods. To take an example from one trade, the Scandinavian, goods carried in collapsible (or folding) containers include glass, drugs, and sweetened fat. These containers, which are owned by the Swedish shipping company, are often returned empty from receivers' premises to the berth, where they are either loaded with exports or shipped collapsed. The non-collapsible types are employed more for general cargo. The measurements of these containers range from 4ft. x 4ft. x 5½ ft. long to furniture van size —say 7ft. x 8ft. high x 14ft. long, and the laden weight from a few hundred-weights to five tons.

Marine containers in general cargo ships are mostly carried in the square of the hatch. It is only in specially designed and equipped vessels that they are not. To quote an example from the Anglo-Continental trade, the vessel is fitted with a self-discharging hydraulic trolley to move containers loaded below deck to and from the square. A fascinating variety of special equipment has been produced for the container operation but we are not concerned with it here, because the intention is that standardisation will in due course cause much of it to be eliminated.

The biggest recent developments in the use of containers have occurred in the United States, the transport and commerce of which lend themselves generally to the container operation. Much of the United States container traffic is often classified as "special", but whether this description has much meaning in the absence of standardisation is not clear. Certainly there are special containers, handling methods, vehicles and ships, many of which trade coastwise. Some containers have been constructed to suit particular commodity requirements and the dimensions and design of others have often been determined by such considerations as (a) the size of the hatchways of vessels engaged in a particular trade, (b) the size and pattern of the transport vehicles employed to carry them and (c) restrictions imposed by the construction and facilities of the factories, depots and ports through which they have to pass. Containers have been mounted on wheels, for example, because no hoists of sufficient capacity have been available at the berth or on the ship.

This fact—that it is so often the container which is adapted—is, of course, one of the reasons why there is such a large number of different types and sizes in use. We find, for example, that containers of just one cross section (8ft. x 8ft.) at present employed by a number of important users in the United States are made in many different lengths, among them 6, 8, 10, 17, 20, 24, 30, 35, and 40ft. To cope with the situation, American road transport contractors have had to adopt various ingenious devices—the split-apart chassis, for example, to allow two containers to operate separately or to combine to work as one unit. These contractors are also searching for means of reducing the delays to their expensive vehicles, which occur at the ship loading berth, when goods have to be taken out of the containers to be shipped loose or, as more

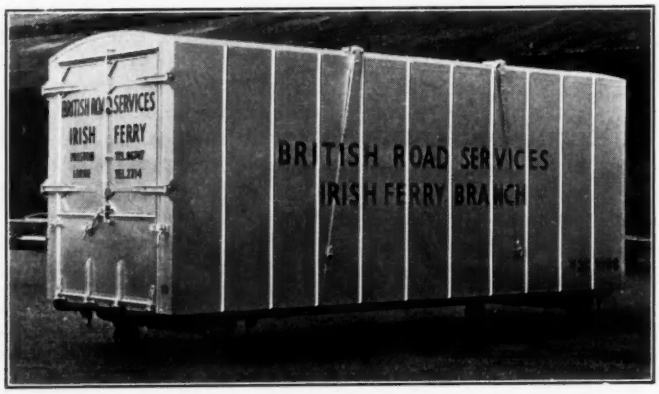


Fig. 1. British Road Services' 12-ton lift container, capacity 1,150 cu.ft.

usually happens, when loose goods are tendered for loading into containers. An American idea to meet the latter situation is that an export receiving depot should be contructed away from the berth. The way this could be operated will be described later.

Road and Rail Traffic

The road organisations of Europe cannot boast (?) as big a variety of containers and container handling devices as those in the North American continent but they are certainly container-minded. British Roadways (the publicly-owned part of the United Kingdom's road haulage industry), for example, own between 2,000 and 3,000 containers, some for general goods, some for special commodities. The cross-section of their larger container is in the region of 7ft. x 7ft. and lengths are 12ft. and 24ft. Like their competitors, the private road haulage contractors, British Roadways offer a door-to-door service, often involving a sea journey. In some instances—between London and Antwerp, for example—the containers travel on wheels. The container illustrated (Fig. 1) has a capacity of 1,150 cubic feet and can carry a load of 12 tons. It operates in the Irish ferry service.

This lift van type of container is a popular one, used by publicly- and privately-owned transport in this country. Terminal handling appliances for such loads are usually fixed, mobile or overhead gantry cranes. Taking road traffic as a whole, it is true to say that only a very small proportion of its general goods travel in containers but for certain special traffics, such as meat and frozen foods, there is considerably more. The quantity of frozen foods transported in insulated containers exceeds 100,000 tons per annum.

The European picture, even if smaller than that of the United States, takes the same form. Belgium has lorries equipped with hoisting decks for loading and unloading small containers at senders' and consignees' premises. Norway has special containers for goods in powder, granulated or liquid form, which are unloaded under air pressure. Like Sweden, she has collapsible or folding containers and special conveyances. Finland has a tank container for cement and also a large general container with retractable feet.

Railway organisations in the United Kindom have been employing containers since 1926, in many instances in a door-to-door service. The containers consist of three types—covered, open and special. The covered section includes large and small utility models for the conveyance of miscellaneous merchandise (Fig. 2). They are easily adaptable for special traffics by the insertion of special fittings, e.g. shelves for bread, hanging bars for clothes and racks for confectionery, washing machines, perambulators, typewriters, motor scooters and other manufactured articles. Two other types of covered containers are constructed primarily for the conveyance of furniture and bicycles respectively.

There are three sizes of open containers and several special types, including wheeled and insulated, refrigerated and bulk carriers. Small wheeled containers (castor mechanism) are being provided by British Railways in increasing numbers. Retractable jacks, operated by a lever, raise the container off its wheels and prevent movement in wagons. One type of wheeled container was specially designed for the conveyance of general cargo on Clyde Shipping Services in Scotland. British Railways own nearly 50,000 containers of over 20 different sizes, with cubic capacities ranging from 46, 70, 90 and 110 cu. ft. to 632, 708, 725 and 735 cu. ft. Over a third are utility models.

The railways of several nations on the continent of Europe, among them Belgium, France, the Netherlands, Germany, Switzerland and Poland, will only accept containers for international transport if in size, construction and other details, they conform to a code determined by the International Union of Railways. Further reference to this code will be made later. A general purpose container used by the Irish Railways measures approximately 7ft. wide x 7ft 4ins. high x 15ft. 5ins. long. Greek Railways, too, use a certain number of containers, but they are of special design. A popular Australian cross-section is 8ft. wide x 8½ft. high. Australian containers will be referred to in more detail in a later section.

The maximum dimensions of loads which can be carried on railways are governing factors in standardisation. The following comparative details will therefore be of interest.

Railways	Maximum load dimensions Height*	Width†
United Kingdom	12ft. 11ins.	8ft. 9ins.
Ireland	13ft. 3ins.	9ft. 6ins.
Europe	14ft. 0ins.	10ft. 4ins.
U.S.A.	15ft. 6ins.	10ft. 9ins.

* This measurement is from top of rail to top of load (centre height).

† These are centre measurements, but are progressively reduced at the top and the bottom, to allow the greatest cubic capacity to pass through tunnels and under bridges.

Container Pools

Although some of the European nations just mentioned are operating satisfactory pallet pools, none of them has yet instituted a container pool. Nor indeed, as far as it it known, has any other nation. In fact, with no national or international standards available, the idea of such a pool seems a little premature. However, since users are always looking for the maximum revenue use of containers—which a pool aims to assure—and handlers are always seeking guidance in the provision of equipment—which a pool aims to give—consideration of the implications of a pool is well worth while.

At a recent I.C.H.C.A. convention held in New York, one exponent of the container pool outlined his idea as follows. The aim of the pool would be to make shipping containers available to parti-

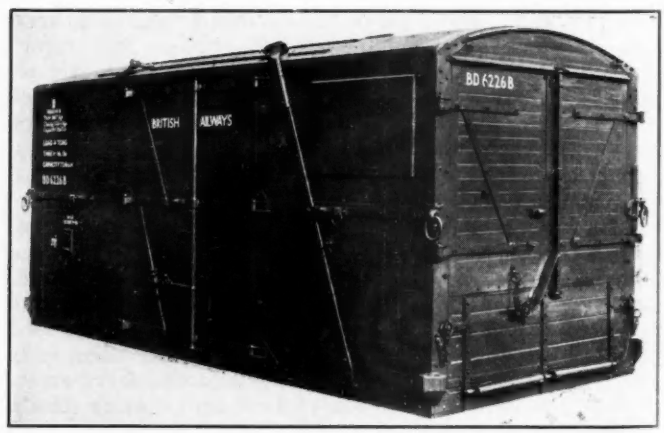


Fig. 2. British Railways' large covered general utility container (load 4-tons).

cipants at lower cost and greater flexibility than could be realised by any individual owner. The pool could be established by present owner-users of containers, together with firms who now hire out containers, who should all contribute at least part of their holdings. Strategically placed depots would be set up, each of which would be responsible for keeping their containers in good repair and for replacements. When properly established, the pool should purchase further containers as necessary, keeping an eye on international standards. It should also, of course, build up a schedule of leasing fees, by which means its solvency could be secured. The expectation of pool users would be to be able to make the maximum use of containers at the minimum cost.

The pool organisation, it was suggested, would have several responsibilities other than hiring out containers. Among them would be (1) to act as a central body for the exchange and distribution of information about containers, (2) to control the movement of containers beyond the port area (a duty which many shipping companies are not keen to undertake) and (3) to establish terminals (away from berths and transit sheds) for handling cargo to and from containers. The creation of container pools, particularly if with standard containers, would be an important step towards solving the " returned empty " problem.

Ship Design

Following the standardisation of pallets, alterations were made to many road and rail vehicles. After a fair interval, certain changes also began to appear in the designs of new general cargo vessels. Considerable caution was naturally used in this sphere, for a new ship is expected to serve her owners for a long time. Most of these changes—the flush 'tween deck, for example, which permits fork lift trucks to work in the hold—proved well worth while and it is now interesting to examine some of the further alterations which might be made to ease the work of loading and stowing containers in ship's holds.

Existing general cargo vessels can carry some containers but one reason why the quantity is limited is that there is no calculated relationship between the size of the containers and the dimensions of the hatchway. Nor can there be, of course, whilst so many different sizes and types of containers are in circulation. If only a few, standard sizes were employed, hatchway dimensions could be calculated multiples of container sizes, plus a suitable clearance allowance—a principle adopted in container ship design. This is a very important point, because it is sensible to assume that, since the operation of moving containers from the square to the wings of a general cargo vessel is so slow, awkward and costly, the space allocated to containers will be the square of the hatch. (Fig. 3)

The part of the ship where the maximum opportunity occurs to provide stowage space for containers is her midship section and it is at the holds amidships where it would be easier, not only to change the relative hatchway-dimensions but to increase them. At these holds, too, it would also be easier, if necessary, to construct two or more hatchways alongside one another, to make available for containers more of the width of the hold. Thus we have an operating reason for placing the ship's machinery aft—that is, to free the midship section for carrying these heavy and cumbersome loads. A further refinement would be to space the decks suitably at the holds concerned, so that each deck height became a multiple of the height of the container. (Figs. 4 & 5.)

Before determining the type of derricks or cranes for the new general cargo vessel, it would also be necessary to know the maximum weight of the laden containers she is expected to carry. The problem of handling gear is, in fact, a difficult one, for the ship must be equipped so that the heavy containers, as well as sets of loose goods and also palletised cargo, can be handled efficiently.

Her handling gear must therefore be fast working and able to place containers in different parts of the hatch square. What is really required, in fact, is either one set of gear, capable of being adjusted quickly, or two sets, with the ability to switch speedily from one to the other. Perhaps deck cranes offer one solution to this problem.

The suggested needs in ship design are, therefore, not world shaking and can be summarized as follows :— The ship's machinery should be placed aft to make available more of her midship section for container stowage. Hatchways, especially those amidships, should be large and the length and breath calculated measurements based on the dimensions of standard containers. Deck heights should also have a similar relationship to the height of standard containers. Handling gear should be suitable for the speedy loading and discharging of heavy containers as well as conventional sets of loose goods. When it is necessary to change from one type to another, it should be possible to do this quickly.

Advantages and Disadvantages of Containers

In planning operations involving the employment of marine containers, one must assume that for a long time to come ships will carry general cargo on pallets, in containers and loose. Although the purpose of pallets and containers is the same, viz. to enable goods to be handled and transported in unit load form, the application of these two pieces of equipment must be different. In recent years, the rapid expansion of container use has increasingly involved the common carrier, to whom the multiplicity of container types and sizes has presented some nice problems. When pallets were standardised, account was taken of the dimensions of road and rail vehicles which, in turn, are controlled by road widths and railway gauges. Standard pallets, moreover, were made oblong to provide better opportunity to cover the whole of the area of a vehicle floor or a ship's deck. Containers, of course, are less flexible as stowing units and have special handling requirements. The latter inherent need is one reason why, although many important commercial undertakings all over the world have evolved efficient systems covering the whole or part of the through transit container operation, these systems have been, in the main, self-contained.

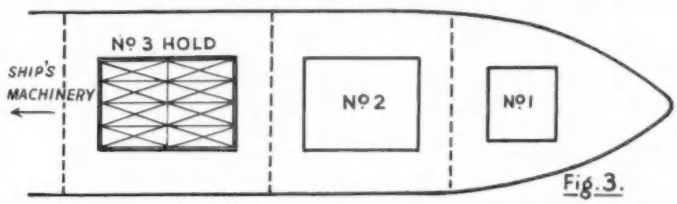


Fig. 3.

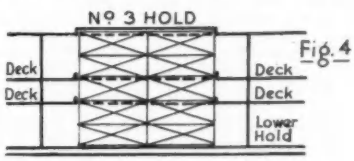


Fig. 4

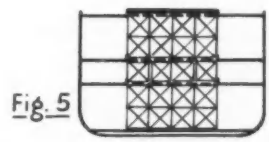


Fig. 5

The potential benefits of employing containers, particularly for through transit, are, of course, the reason why this method is attracting so much attention. They include (a) quicker turnround of vehicles, (b) virtual elimination of loss by pilferage and damage (c) savings in labour costs, (d) reduction in packaging costs, (e) lower insurance rates and (f) quicker ship turnround. The chief disadvantages are (i) loss of cubic space in containers when stowing miscellaneous goods and (ii) loss of vehicle and ship space because containers are unwieldy. Suitable loose goods for filling space in between containers in ships' holds are not always available.

The benefits mentioned will not materialise unless attention is paid not only to dimensions but to construction. In some discussions it has been maintained that the subject of standardisation should be " large containers handled solely with the aid of independent lifting equipment" and should exclude "containers handled by special devices ". That distinction emphasizes that design is

as important as dimensions, since, if operations are to be speedy, there must be easy and safe means of engaging lifting gear. Another practical consideration stimulating the demand for standardisation is, therefore, the desire to know the maximum weight which will have to be lifted at the various terminals.

Standardisation Trends

Although so many of the vessels engaged in international trade are bulk carriers, tankers and passenger ships, there is, nevertheless, a preponderance of general cargo carriers. As mentioned earlier, existing general cargo vessels can already carry part loads of containers. Two of the refinements of ship design mentioned above would make available a greater amount of suitable under-deck container stowage, which could be used more quickly and more economically. These refinements can only be made if the sizes of the containers the ship is to carry are restricted in number.

Standardisation of containers has not yet been attempted internationally and is being tackled nationally by only a few countries. To amplify a statement already made, the types of container in mind are those of rigid, flexible or collapsible construction, not mobile in themselves, but requiring mechanical handling. They may be designed for transporting manufactured goods, liquids, solids or even gases.

In the United Kingdom, where the economic position of the country depends so much on its international trade, it is felt by many that the formulating of national and international standards should be undertaken concurrently. In the United States, discussions upon container sizes have so far mainly revolved round the employment of containers in the road, railway and steamship traffic in that country but not in foreign lands. The United States Defence Transportation Department has determined that a standard box, container, van or truck body should be 8ft. x 8ft. x 40ft. long but modules 10, 20, and 30ft. in length would be suitable for their transportation. These four sizes have, in fact, recently been selected for standardising by the American Standards Association in a tentative standard document at present being circulated among all U.S.A. national groups.

It is fair to say, however, that an 8ft. x 8ft. x 40ft. container, which can carry a load of up to 20 tons and resembles a pantechnicon, is not suitable for ship work, nor indeed, for road and rail transport in most countries of the world. Further, most Americans are aware that even their common 8ft x 8ft. cross section is too large for general interchange and transport internationally. This statement is substantiated by reports that, because of their need to send supplies to bases all over the world, the U.S. armed forces have modified their views and would be sympathetically disposed towards the international standardisation of dimensions suitable for land transport in other continents. For this and other reasons, the American Standards Organisation's technical committee, being concerned not only with their own national standard for pallet containers, cargo containers and van containers (demountable truck bodies) but also with the international co-ordination of American and foreign container sizes and practices, will undoubtedly have in mind their armed forces' experience and attitude. A national standard usually gains in value if it is in accord with the international one.

The purpose of standardisation is to facilitate the economic handling of goods. It has been proposed that a new technical committee be set up by the International Organisation for Standardisation (ISO) for the study of freight containers. When this committee begins to function, it will undoubtedly take account of work already done by national bodies in America and Australia and by international bodies, such as the International Container Bureau and the International Union of Railways. The former body was set up in 1933 under the auspices of the International Chamber of Commerce " to guide, facilitate and, if necessary, instigate research by builders of containers ". The I.C.B's definition of the container will be of interest. It is: " An article of transport equipment (lift-van, movable tank or other similar structure):

(a) of a permanent character and accordingly strong enough to be suitable for repeated use;
(b) specially designed to facilitate the carriage of goods, by one or more modes of transport, without intermediate reloading;
(c) fitted with devices permitting its ready handling, particularly its transfer from one mode of transport to another;
(d) so designed as to be easy to fill and empty; and
(e) having an internal volume of one cubic metre or more.

The term 'container' includes neither vehicles nor conventional 'packing'."

The International Union of Railways has produced a code, revised in Prague as recently as 1959, which is the nearest approach to standardising containers made so far by any large national or international organisation. This code lays down the " technical conditions with which containers must comply in order to be accepted for conveyance in international traffic ". An important note in the document (U.I.C. Code 590) points out that although containers, by their nature, are suitable for all forms of transport—road, rail and sea—it was thought useful to make provision for containers, known as " marine " containers, specially designed for handling in the holds of ships. Part I of the code deals with large containers (those deemed to have a cubic capacity of more than 106 cu. ft.); part 2, with containers of less than that cubic capacity; part 3, with refrigerated containers; and part 4, with the marine containers, which must be of the covered type only. Four sizes are laid down for marine containers, viz.

Category	Height		Width		Length		Approximate inside volume	
	Metres	Inches	Metres	Inches	Metres	Inches	Metres³	feet³
1	2.05	81	2.15	85	2.92	115	10	353
2	2.10	83	2.10	83	2.40	95	8	282
3	1.85	73	1.50	59	2.30	91	5	176
4	1.85	73	1.25	49	2.40	95	4	141

It will be noted that the maximum cross-section dimensions are about 7ft. x 7ft.

This code is, in fact, a 30-page booklet, dealing not only with container dimensions but with loading capacity, means of engaging lifting gear, position, size and strength of doors, fitments for securing, ventilating, testing, roof shape and a host of other requirements. Perusal of it emphasizes the magnitude of the task ahead of any committee attempting to standardise even only dimensions.

This is, indeed, what the Standards Association of Australia has set out to do, confining their initial activities to preparing standards for the dimensions of large containers of over 450 cubic feet and 6 tons carrying capacity. Since these are, of course, intended for exchange among road, rail and sea transport, representation on the committee included road and rail transport, shipping, port authorities, transport users, container manufacturers and materials handling interests. One particularly interesting point about the draft standard the committee has produced is the statement that containers should be of sizes to accommodate Australian standard pallet loads, two abreast. Another size-determining factor mentioned is the 8ft. statutory width limitation by their road authorities. The draft document proposes the following four sizes as standard:—

External dimensions			Approximate capacity Cubic feet	No. of pallet loads on container floor
Width	Height	Length		
8ft.	8ft. 6ins.	8ft. 2½ins.	465	4
8ft.	8ft. 6ins.	12ft. 5¼ins.	710	6
8ft.	8ft. 6ins.	16ft. 8ins.	960	8
8ft.	8ft. 6ins.	33ft. 7ins.	1,975	16

The Future

Our glance at this complex picture has not been much more than a cursory one. It is obvious, however, that one important question which arises from the present situation is how much and how quickly standardisation will simplify it. So many containers in current use have been made for special transport or special requirements. Will these special requirements stay? Will individuality and self-sufficiency continue to be economic or will there be a more general acceptance of uniform conditions? Even if change would be profitable, how quickly will it be made where large sums of money have been spent on special equipment?

To nations whose economies depend upon international trade, international standardisation is always important. The attitude of the International Organisation for Standardisation is that ISO recommendations are a guide to nations producing their own standards. This seems sensible; thus it is hoped that the ISO Technical Committee will be set up quickly and get to work without delay.

Even when containers are standardised, however, carrying them filled with loose goods in even the most suitable vessels will still present some interesting problems to port operators. If the containers are through transit and are to be collected direct from the vessel, the most important need will be to co-ordinate application by transport with availability of container. Even if this arrangement breaks down and through transit containers have to remain temporarily on the quay, no insuperable difficulty should arise. It is the port-to-port method which produces complications, the method whereby consignments of general cargo are stowed mixed in containers at the port of loading and have to be taken out of them and sorted to Bill of Lading consignments at the port of discharge. This method can save much ship-working time, but does not make for quick and easy work on the quay and in the transit shed. If shipments of containers became substantial, work ashore would have to be organised in some way as this: Separate areas would be allocated for (a) containers waiting to be emptied, (b) working space for discharging containers, (c) stowage ground for cargo and (d) containers which have been emptied. The loaded container, which would usually be stowed in the square of the hatch, but sometimes on deck, would be lifted ashore by quay crane or ship's derrick, which would land it on to one kind of equipment or another—a heavy-duty truck or trailer, which could be towed, or, perhaps, a stillage board, which would be conveyed by a powered stillage truck. It would then be moved to a special area to await its turn for discharge. For this operation, it would be transferred to the shed, so that its contents could be re-assembled on the shed floor in Bill of Lading consignments. When this job had been completed, the container, now empty, would again be moved, this time to another special area, where, in due course, it would begin to go through the same procedure, but in reverse, to carry exports.

This complex operation would need so much space and could be the potential cause of so much congestion, however, that means have been sought, in advance, to simplify it. One of the ideas put forward in the United States was that Dock and Harbour Authorities, or, perhaps, big shipping companies, should provide terminals some distance away from the docks. This arrangement envisages the construction of a large shed, the floor of which would be marked out to take part of the export cargoes of a number of vessels. Vehicles bringing small export consignments (weighing up to, say 5 tons) would not take then to the transit shed, but would unload them at this receiving depot (the American term is "consolidation terminal") where they would be piled in the appropriate port or ship stowage. In due course, the cargo for each different port would be loaded into containers, which would then be transported to the berth, possibly three, five or even ten miles away. It is understood that one such "consolidation terminal" is already in use experimentally in the United States.

The fewer the number of different types and sizes of containers in use, the easier it will be to organise any shipwork employing containers. However, whether easy or difficult, if the port-to-port method gains favour, unless some such scheme as a remote receiving depot is simultaneously developed, the berth constructed to deal with container traffic will certainly have to be spacious.

Reconstruction of Shipyard at Lowestoft

Completion of First Phase of Modernisation Plan

By D. J. COATS, B.Sc., A.M.I.C.E.

The Shipbuilding firm of Richards Ironworks Ltd. at Lowestoft has recently brought into commission the first stage of a reconstruction of their shipyard on modern lines, and further development is contemplated to allow the building of larger vessels in the future.

This small East Anglian shipyard was established in 1876, and since that date has expanded steadily on the present site. It has been part of the United Molasses Group since 1957. Trawlers, tugs, drifters, coasters and other such vessels up to 180-ft. keel are now built, and these are launched into a relatively shallow creek off the inner harbour, but the acquisition in 1954 of an adjacent property with a frontage on to the main channel of the inner harbour demanded a re-examination of operations.

A scheme for the ultimate development of the site to allow the best layout for efficient working and the adoption of modern methods of ship construction and repair was evolved. As a first stage of this plan, it was decided to reclaim some land while extending the wharf frontage, to erect new shops and ancillary buildings sufficient for present requirements, and to construct a new office block.

Bores were sunk on the site during the spring of 1959 and the information so obtained determined the foundation and piling arrangements adopted for the now completed work, and will be valuable in the design of future phases of development. Construction work started late in 1959 and the new shops were occupied and operational by the end of 1960. The new office block is now nearing completion and work on further extension of the wharf frontage is at present in hand.

New Engineering Shops

The main structure in the completed phase of reconstruction is approximately 200-ft. square and 26-ft. 9-in. to eaves and is divided into three 200-ft. long bays. The building is of welded fabricated steel portal construction with reinforced concrete spread footings, an 8-ft. brick dado surround, and aluminium side and roof cladding. Provision has been made for the addition of a fourth and higher bay for fabrication of sub-assemblies in the future.

The bay nearest to the wharf is separated from the other bays by a curtain wall of aluminium sheeting and 8-ft. brick dado construction and is used as an engineering and fitting shop. It is 55-ft. wide and is served by a floor operated 5-ton E.O.T. crane of box girder construction which has a clearance to floor level of 18-ft. 3-in. Ample daylight is provided through both roof and side patent glazing and 400-w. mercury fluorescent bulb fittings above crane level give good overall lighting at night.

There is no division between the other two bays which are each 70-ft. wide and serve as frame bending and platers' shops.

Each of these bays is serviced by an E.O.T. crane similar in construction to that in the engineering bay—their capacities being 3-ton and 5-ton for the frame and plate bays respectively. Much of the existing machinery and plant has been re-conditioned and re-housed in the new shops, and new acquisitions include a horizontal plate rolls of 23-ft. capacity which has been installed in the plate bay. A bending floor larger than formerly used has been included in the frame bay with scrieve board and new frame furnace adjacent, the latter allowing continuance of present practice although space has been allocated for the installation of cold bending plant in the future. Plant layout has been so arranged that the flow pattern is directed towards both the existing and the proposed new building berths.

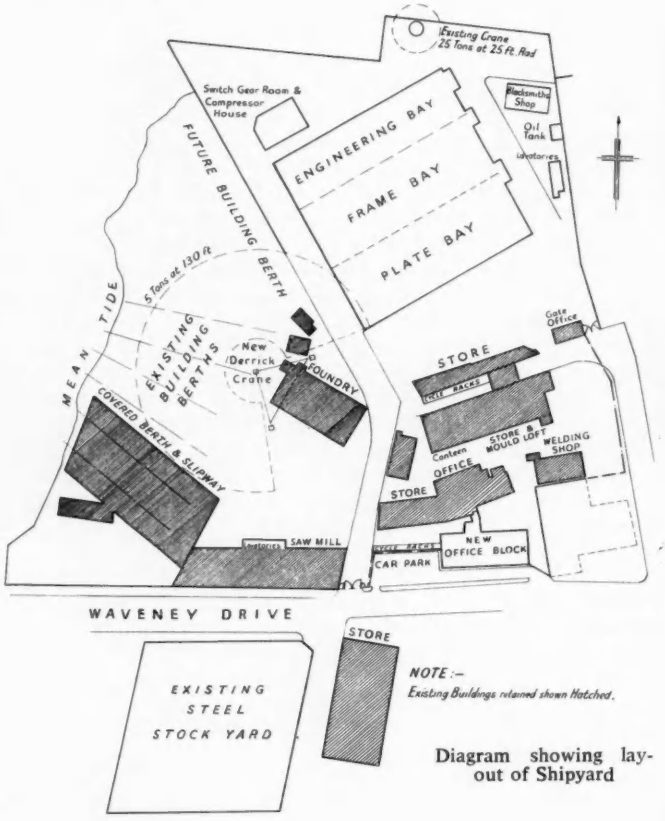


Diagram showing lay-out of Shipyard

Building Berths

The extension of existing building berths to accommodate longer ships has been made possible in this first phase of the development by the demolition of a block of old buildings at their upper end. However, in later phases of the work it is envisaged that new and larger berths will be constructed to allow launching into the deeper channel of the inner harbour, and these will be served by a 15-ton travelling crane capable of lifting assemblies from the exits of the new shops to any part of the berths. As a provisional measure, full crane coverage of the existing berths and shop exits has been achieved by the erection of a 5-ton electric derrick crane with a 150-ft. jib in a strategic position.

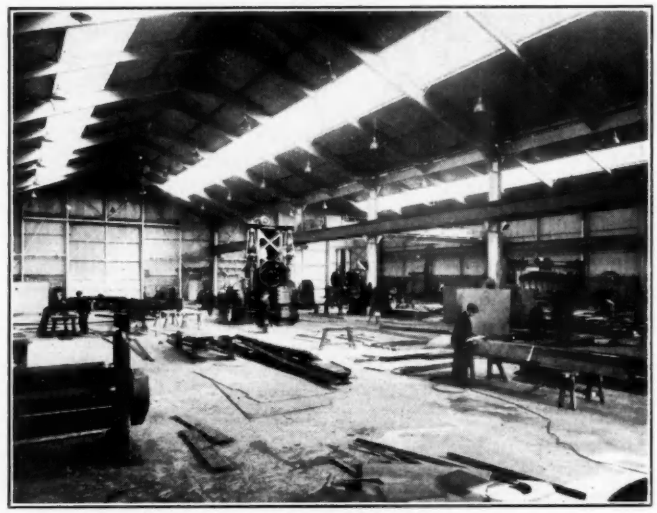
Other Work

As has already been mentioned, the small existing wharf frontage has been or is being extended both eastward and westward. In all this extension work 50-ft. long Larssen 4B steel sheet piles tied back to anchor beams were used.

Ancillary buildings completed include a new blacksmith's shop, a building housing electrical switchgear, electricians' shop, air compressors and a shipwrights' shop, two new lavatory blocks and a new office block.

A completely new unified electrical installation network now supplies power to both new and old buildings. The incoming supply is at 11,000 volts transformed down to 440 volts adjacent to the switchgear room. Provision has been made for increased welding facilities and 6 and 12 operator welding plug boxes have been established at various points at the wharf and throughout the yard and new shops.

A new compressed air network was also established and two



Interior view showing new Frame and Plate Bays.

View of wharf frontage and exterior of new shops

400 c.f.m. Broom and Wade compressors installed. Space has been left for the addition of a third compressor of the same size if required.

The completion of the first phase of reconstruction not only provides new facilities for speedier ship construction and increased repair capacity but also allows better use to be made of existing plant and premises.

Messrs. Babtie, Shaw & Morton were the consulting engineers for the work and the main contracts were: Civil Engineering and Building Works, Messrs. Tooley and Youngs Limited; Structural Steelwork, Messrs. Robert Stevenson (Structural) Limited; Electrical Installation, The Eastern Electricity Board.

Modern American Bulk Handling Equipment

Particulars of Three High Capacity Plants

Specially Contributed.

This article describes three high-capacity bulk handling plants of which two are designed for the export of coal and one for the import of iron ore. All three installations were commissioned between 1956 and 1958 by the Chesapeake and Ohio Railway Company of Richmond, Virginia, U.S.A., for operation by that company, and a brief description of each plant, with notes upon their unusual or outstanding features, is set out below.

2,000 TONS PER HOUR CAPACITY COAL LOADING PLANT

Late in 1955 it was decided that an urgent need existed for additional facilities at Newport News to handle prepared coal from railway wagons to coastal and seagoing vessels. It was planned to provide a plant of 2,000 tons per hour capacity which would handle coal with the minimum possible breakage or degradation. Use was made of an existing concrete jetty (Pier No. 15) for the installation of a conveyor-type coal handling and ship loading system, and existing railway gravity marshalling yard sidings were embodied in the scheme.

Brief Particulars

Coal wagons of up to 70 tons' capacity are led through an oil-fired thawing-out plant to a rotary tippler by means of a high-speed slip-wheel charger or "barney." The barney, which has a rating of 1,000 h.p., will feed wagons up an incline to the tippler on a 60-second cycle. Under the tippler the coal is received into two hoppers and thence via 72-in. wide belt variable speed feeders and a 60-in. wide conveyor belt, to a 150-ton capacity receiving hopper installed on the pier. The 60-in. conveyor is driven by a 400 h.p. induction motor and has a maximum speed of 634-ft. per minute, which can be reduced down to creeping speed by means of an eddy-current coupling control. The coal is lowered from the main conveyor into the 150-ton "surge" hopper by an arrangement of extensible chutes having variable angles of inclination, and it is claimed that the surge hopper can be filled without appreciable degradation of the coal. At the base of the hopper there is a rotatable pan conveyor chute carrying a near vertical 4-ft. diameter telescopic steel tube, which in turn feeds to a variable speed belt trimming machine via an hydraulically-operated gate. In Fig. 1 can be seen the base of the surge hopper and the covered pan conveyor which is normally operated full of coal and controlled by the regulating gate at the lower end of the near vertical telescopic chute. The telescopic chute, which in the illustration is partially concealed by the ship's funnel, is controlled at its lower end by wire ropes from four chute hoisting winches, thus providing the telescopic tube with rotational, tilting and vertical movements.

The setting of the hydraulic gate referred to above, is normally adjusted to match the rate at which the main 60-in. conveyor is delivering to the surge hopper, and so that the telescopic tube is kept full of coal. After the various chutes and gates have been adjusted to the particular conditions obtaining, any variations in the speed of the main conveyor is relayed by tacheometer generators to adjust automatically the speed of the following feeders.

A general view of the shipping piers at Newport News is shown at Fig. 2.

6,000 TONS PER HOUR CAPACITY COAL LOADING PLANT

This remarkable plant was commissioned about three years ago at Presque Isle near Toledo, Ohio, and is claimed by the Chesapeake and Ohio Railway Company to be the largest single unit of its kind in existence.

Fig. 1. Coal loading plant at Pier 15.

The plant will primarily feed to the larger Great Lakes colliers, but anticipates an increasing export to ocean-going vessels via the St. Lawrence Seaway.

Description of Plant

Seventy-ton railway wagons are fed from a level reception marshalling yard by diesel-electric shunting engines — and positioned two at a time over a "barney" pit, accurate spotting being assisted by a friction-type, or "inert," retarder. The wagon-hauling barney runs on two rails within the main track and has a head which remains flush with the body except when propelling in the foreward direction, when the head is raised by a friction clutch and in the raised locked position engages the rear coupling of the pair of coal wagons. The wagons are hauled thus for a total distance of 295-ft. to a tandem rotary tippler, the track level of which is 23-ft. higher than at the barney pit, the total cycle time of the barney haul being 60 seconds, including 5 seconds rest. A general view of the inclined haul is shown at Fig. 3. To obtain this fast 60-second cycle, the barney is powered by two one-hour rated mill motors developing 2,000 h.p., and can hoist two wagons up the 15% gradient at speeds of up to 900-ft. per minute, the return speed of the barney head being 1,400-ft. per minute.

The rotary wagon tippler (Fig. 4) has a 40-second tip and return cycle, and allows 20 seconds wagon charging time thus equalling the 60-second cycle of the barney haul. The tippler drive has adjustable voltage and amplidyne control.

The empty wagons are shunted from the tippler by the following loaded pair on to a graded circular empty track and thence to the empty marshalling yard. This arrangement is an improvement on the normal "kick-back" because no time is wasted in the tippler in ensuring that the wagons are still coupled together—a necessity to avoid derailments over a kick-back. Immediately clear of the tippler the track descends on a 2.1% gradient to accelerate the wagons, and thereafter a 1.2% gradient is continued around the semi-circular track of 425-ft. radius. Electro-pneumatic wagon retarders are installed near the tangent switches leading to the empty wagon marshalling yard.

The coal is discharged into six shallow hoppers beneath the tippler, each hopper

being furnished with a variable speed belt feeder distributing to a 96-in. wide conveyor. The rate of feed to the main conveyor is automatically regulated by a continuous belt weighing and recording machine. The coal conveyor system comprises five belts each 96-in. wide, first a collector belt from the feeders, second an inclined transfer conveyor which elevates the coal through about 40-ft., third a long dockside conveyor and fourth the ship loader shuttle conveyor. The dock conveyor discharges on to a fixed conveyor on the ship loader by means of a travelling tripper attached to the latter. The fixed pan conveyor in turn discharges to a shuttle conveyor which empties into a small hopper at the top of a telescopic chute of the same type as in use at Newport News. It will be seen from Fig. 5 that the telescopic chute, the chute operator's cab and the shuttle conveyor with drive are all suspended from a shuttle trolley to which power is transmitted through a system of collector rails suspended from one of the main bridge girders of the shiploader structure. The shuttle trolley feature of the system allows horizontal traversing of the chute or coal trimming machine within the ship's hold. The apron or broom can be raised to the vertical position to accommodate the berthing of a vessel, and here the trolley is moved back to within the shiploader bridge structure. The apron hoist machinery thus requires to be only of capacity to raise the empty apron.

Fig. 2. Shipping berths at Newport News.

In Fig. 5 can also be seen the standing and rotational sections of the telescopic chute, at the bottom of which is a cowled discharge chute (which is intended to be replaced when required by a belt-type high-speed coal trimmer). The rotatable portion of the telescopic chute is carried upon a double ball-race ring bearing of a type designed to accommodate multi-directional stresses and to assure free rotation regardless of the position of the centre of gravity of the suspended portion. Rotation of the chute is powered by a 13½ h.p. series motor from a generator located in the ship loader and power for the future trimming machine will be taken through copper slip rings provided in the rotatable section of the chute. It will be seen that telescoping and tilting of the vertical chute is controlled by wire ropes from four rope drums, each having its own control and driven by four 50 h.p. motors. However, a master control is provided and this operates all four hoist mechanisms when it is desired to raise or lower the chute without tilting it.

The following supplementary drives give an indication of the size and duties of the shiploader:

Shuttle trolley—30 h.p. squirrel cage.

Apron Hoist—165 h.p. series wound D.C.

Shiploader longitudinal travel—Four 65 h.p. shunt wound D.C.

Special Features

Special control features are included in the wagon-spotting system at the foot of the approach incline. A section of insulated rail at the far end of the barney pit will lock out the hoist circuit if this rail is shorted by a railway wagon, thus preventing commencement of the hoist cycle if wagons are in a position to foul the barney head on rising. A second insulated section must similarly be occupied by a wagon before the barney head can rise in its correct position for contact with the rear wagon coupling. The barney control circuit also incorporates a "head raised" limit switch and a "complete-cycle" interlock to prevent reversal of the barney except at the ends of its travel. Featured also are travelling-nut type limit switches backed by track-type limits which ensure the safety of operation of the wagon tippler, a belt weighing and totalising device at the foot of the main inclined conveyor which controls and maintains a pre-set rate of flow at any rate between 1,000 and 6,000 tons per hour, interlocked controls on the various belt drives and skew limits on the shiploader longitudinal travel drives which automatically de-celerate the motors driving the leading bogies until the bridge structure is re-aligned.

Maintenance problems are minimised and hazard-free operation is assisted by the provision of such features as spillage trash belts and trays at the conveyor transfer points, rail clamps which are electrically interlocked with an anemometer, thus preventing travel of the shiploader if the wind velocity exceeds 38 m.p.h., and filtered air pressurising systems in the machinery and control houses.

General Considerations

It will be of interest to learn whether operation of this very large capacity single unit justifies the use of a 40-second cycle for the wagon tippler, or whether it is found more economic from the maintenance aspect to operate the tippler below its maximum speed. It is generally agreed that extremely robust and well-balanced side rotary tipplers are required when the tippling cycle is reduced much below 60 seconds. Only the operator's experience over a protracted period will provide an authoritative answer to this question.

A view is held in European countries that very large capacity single units are economic only in the special circumstances of loading to self-trimming vessels specially designed for the conveyance of bulk cargoes. Tweendeck trimming and topping-off operations may occupy a high proportion of the total loading time of general cargo vessels, and in these cases the provision of twin plants each of half the required total capacity, are normally adopted.

A necessary concomitant of the plant pre-

Fig. 3. Wagon tippler in foreground, with coal loading facilities in background.

Fig. 4. 40-second cycle tandem tippler.

sently reviewed is that degradation of the coal must take place unless the flow system is kept filled by a considerable volume of coal, and thus the final topping-off and completion of a cargo trimmed to a vessel's loading lines, may thereby be complicated. Here again, the experience of the Chesapeake and Ohio Railway Company should provide an answer.

4,300 TONS PER HOUR CAPACITY ORE UNLOADING PLANT

This modern ore ship-discharging facility at Newport News, was commissioned in 1957 at a cost of about £3 million.

The Ore Pier

Three double-apron type travelling and slewing grab unloaders, each of 1,440 tons per hour capacity, are carried on a new pier constructed to accommodate the largest bulk carriers. The main pier, 706-ft. long by 82-ft. 4-in. wide, is of cellular sheet-piled construction, the cells having a sand and gravel fill which is topped by a concrete deck. The three unloaders, each weighing over 1,200 tons, are carried through four 175 lb. dock section rails by heavily reinforced concrete beams supported on steel H piling which is independent of the dock cell walls. Energy-absorbing rubber-cushioned fenders are provided on both sides of the solid quay portion of the pier. Seawards of this solid portion there is a 485-ft. length of dolphin and inter-communicating bridge construction, ended by a heavy cellular pierhead, thus providing a berth of 1,191-ft. total length. The berth is provided with fuelling and watering facilities.

The Grabs

The rating of 1,440 tons per hour for each grab transporter is based upon ore weighing 150 lbs. per cubic foot being handled in 18-ton loads on a 45-second cycle. A total of thirteen grabs ranging in size from 245 down to 80 cu. ft. capacity are available on the jetty. These grabs are of the level-cut wide-spread scraper type having a payload of over 50% with open spans of 32-ft., down to 18-ft. for the 80 cu. ft. size. They are designed to have a low centre of gravity in the open position and are provided with quickly-changeable linkages so that for cleaning-up work a grab change can be made in less than 5 minutes. The cargo is normally completely discharged by the grabs when working ore carriers, but small bulldozers are often used to facilitate clean-up in 'tweendeck ships.

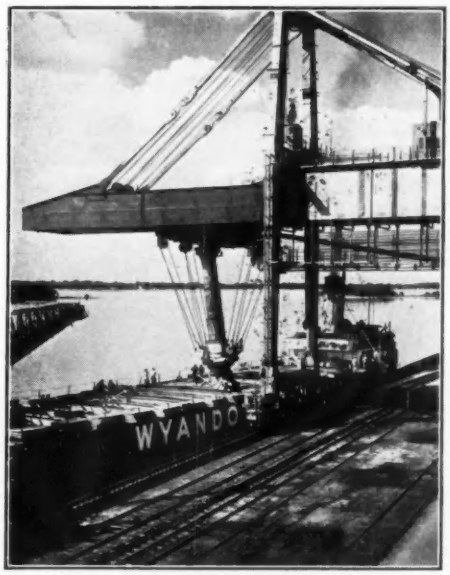


Fig. 5. Loading gantry and telescopic chute of loading plant at Toledo

The Slewing Trolley

Each transporter is provided with a rotatable trolley, operator's cab, machinery house and short-jibbed crane of 18-ft. radius, and the whole assembly is suspended from an upper trolley on a sealed ball-race, the upper trolley being powered to travel over the length of the apron booms. The short-jib crane rotates through 360° and handles the grab hoisting and holding ropes.

The slewing trolley thus has a coverage within the ship's hold of a circle of 36-ft. diameter, which with the 32-ft. span of the largest grab provides an adequate coverage of the hatchway areas of normal vessels, with a minimum of longitudinal travel. The location of the operator's cab immediately under the jib provides the operator with good all-round vision of the complete working range of the bucket. A cab cross-travelling speed of 552-ft. per minute is obtained through two 324 h.p. motors.

Control of the Grab

The hoisting and holding or closing, winch drums of a grabbing crane are sometimes driven by separate motors with mechanical speed regulation to prevent the bucket closing when lowering or opening when hoisting. More often the drive to both drums is from one motor, the holding barrel being controlled through a coil clutch or similar device, from the constantly engaged hoisting barrel. The plant under review however includes a two motor bucket control system which drives the hoisting and holding winch drums through a planetary differential winch which permits simultaneous motions of the grab (such as opening and lowering simultaneously).

The air-conditioned operator's cab has two "joystick" control levers; that on the

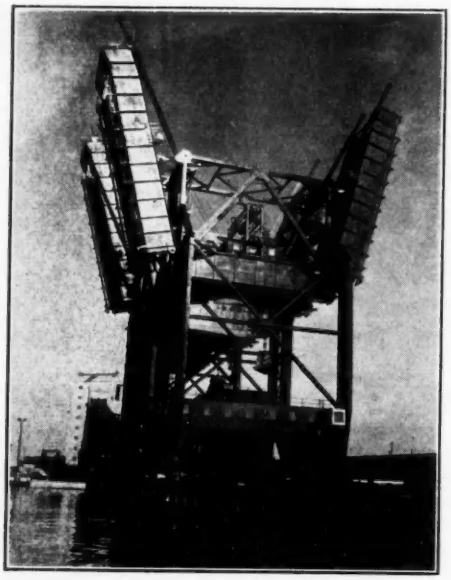


Fig. 6. Two transporters showing slewing trolley and aprons in raised position.

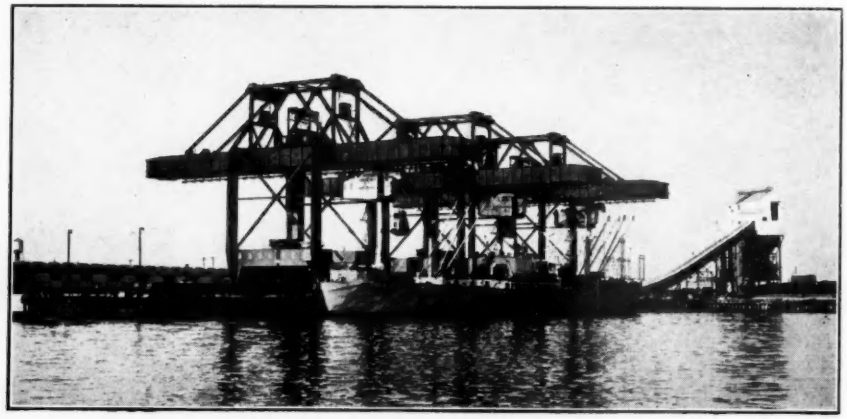


Fig. 7. Ore unloading facilities at Newport News, Va.

right hand controlling hoisting (by fore and aft motion) and closing or opening of the grab (by left and right motion), while that on the left hand controls trolley travel and rotary movement. All motions can of course be super-imposed.

The hoist motion is driven by a 350 h.p., 60-minute rated shunt wound mill motor, the amplidyne control of which provides generator voltage regulation, current limit acceleration and de-celeration, and emergency dynamic braking with self-excitation of the motor shunt field The closing motion is driven by a 187½ h.p. motor.

Conveyor and Train Loading System

The grabs discharge into a 120-ton capacity receiving hopper equipped with a variable speed apron feeder plus a short accelerating conveyor. This conveyor feeds ore to one of two wharfside conveyor belts which lift the ore through about 90-ft. to two 900-ton receiving and storage hoppers. Ore storage levels are monitored by radioactive cobalt sources and appropriate receivers mounted outside the hopper walls, so that no damage is incurred by falling or rebounding ore. The ore is withdrawn from the bins by means of four apron feeders, two under each bin, and is discharged into four 45-ton capacity weighing hoppers. Each hopper is weighed when filled by four load cells and then reweighted after being emptied, the gross tare and net weights being automatically recorded on the weigh ticket. The hoppers are positioned so that wagons may be loaded with a single spotting on the twin loading tracks below. The apron feeders which fill the weighing hoppers are automatically controlled by load cell scale equipment. The empty and loaded rail wagons are handled by three 55-ton side arm diesel-electric pushers.

A feature of interest is a specially-provided wagon-washing plant situated adjacent to the loading hoppers. Here empty wagons are washed internally by high pressure water sprays after having been revolved through 120° in a side-rotary tippler.

Electrical System

The power supply to the wharfside belts and each unloader is 4,160 volts, 3-phase, 60 cycles and a five-unit motor generator set in each unloader tower machinery house provides adjustable voltage control of the grab hoist, grab closing, trolley travel, tower travel and the apron hoist motions. The apron feeder beneath the 120-ton receiving hopper is powered from a separate motor generator set and exciter. The jib slewing motion is the only constant potential drive on the tower and is powered from a 75 Kw., 250 volt D.C. generator on the main tower motor generator set. Subsidiary drives on the unloaders are as follows:

Trolley travel—Two 187½ h.p. shunt wound, 400 volts.

Tower travel — Four 65 h.p. shunt wound, 290 volts.

Jib slew—25 h.p. series wound, 250 volts.

Hopper travel (centring between the two wharfside conveyors)—7½ h.p. induction, 440 volts.

Apron feeder—15 h.p. shunt wound, 230 volts.

Accelerating belt—20 h.p. induction, 440 volts.

Three non-resetting fault finder panels, with alarm bell and light in the operator's cab, are provided at strategic positions on each unloader for the rapid location of electrical faults.

Each 48-in. wide wharfside conveyor is driven by a 600 h.p., 4,160 volt wound rotor induction motor controlled by a 10-step magnetic starting system.

General

Two of the three grab transporters are shown at Fig. 6 with their double aprons in the raised position ready for the reception of vessels. The twin reinforced belt conveyors can be seen to advantage and are each rated to carry 3,600 tons per hour at a speed of 600-ft. per minute to the main receiving and storage hoppers and train loading house, which can also be seen in the background. A photograph of the plant in operation is reproduced at Fig. 7.

During a discussion in the U.S.A. upon a paper describing this very fine plant, some criticisms were offered of minor design matters, mostly regarding the high first cost of the scheme and the large power consumption necessary to operate it. However, the greater overall efficiency of operation and reduced ship turnround time are claimed to outweigh any additional capital and operating costs.

This plant is undoubtedly an example of a near ultimate design in the provision of a specialised bulk handling facility.

New Zealand Port Guide

"The New Zealand Port Information Manual" has been published in two parts—text and plans. Part I (Text) supplies information relating to navigational aids, facilities, installations etc. and is designed to be used with Part II (Plans). Both parts supersede the "New Zealand Nautical Almanac and Tide Tables, Vol. II, 1954."

A useful and attractive feature of the plans section is that each plan is accompanied by an aerial photograph. As both parts are in loose-leaf form, information can be kept correct by inserting additional or replacement pages issued as requisite by the New Zealand Marine Department. The address for inquiries and mail orders is: The Secretary for Marine, P.O. Box 2395, Wellington, C.1, New Zealand.

Shipping and Stowage of General Cargoes

Some Difficulties Experienced in the Liner Trade

At the conference of the International Cargo Handling Co-Ordination Association held in London recently and referred to in the May issue of this Journal, one of the Papers dealt with the difficulties of shipping and stowage of general cargoes. In his paper, extensive abstracts of which are published below, Mr. J. O. Grieve of Wm. Thompson and Co., managers of the Ben Line Steamers Ltd., examines the ramifications of the general cargo liner trade and gives details of some of the more intimate problems with which his Company has to deal.

Although there is perhaps no specific definition of a liner it is generally agreed that the term applies to vessels which are on scheduled runs with advertised sailing and arrival dates and cater for all types of cargo offered or likely to be offered on a particular route.

Outwards from the U.K. this normally consists of manufactured and processed goods emanating from anything up to 6,000 or more shippers. Homewards the cargo to a large extent consists of raw materials and foodstuffs but there is also an increasing amount of processed goods being carried. The liner operator must acquaint himself with the characteristics of all the items he is carrying and must ensure suitable handling arrangements at the ship's side and stowage arrangements on board.

Sailing to Schedule

The ability to sail a ship on schedule depends principally upon the co-operation of the shippers in presenting their cargo when required by the shipping company and in sufficient time to allow it to be loaded on board within a certain period after the advertised closing date.

As to what constitutes a reasonable period varies between trades and frequency of sailings. There is, however, an undoubted tendency for certain shippers to wait until the last possible moment before presenting their cargo, and here I would submit that the aim should be to have the cargo at the ship's side at least one day before closing date together with the necesary customs documents to allow it to be placed on board immediately.

It happens frequently that a shipper has done his utmost and has succeeded in presenting his cargo in good time, the advantage of which is lost through absence of Customs Export Documents with consequent and proper refusal of H.M. Customs to allow shipment.

There is also the situation where export documents are not required for certain destinations provided the goods do not exceed a given value (£2,000). Since the value is not marked on the package, there can be delay in ascertaining whether or not documents are required and this could perhaps be overcome by an appropriate **mark** on the items as to whether the value was under or over the statutory amount. We make the point that this surely is something which could be introduced as a standard practice to avoid delay.

The shipowners of course hope that the time will come when the abolition of pre-entry for most goods will become an accomplished fact and negotiations in this respect are proceeding.

A Fertile Field for Study

The rapid production of Bills of Lading to enable exporters to obtain credits, etc., necessarily depends upon speed of shipment and accuracy of tallying on board being translated into mates receipts and shipped returns. At present the majority of consignments are identified by marks which cannot be digested by normal computing and tabulating machinery resulting in the processing and collation of tallies having to be done manually—a laborious, time absorbing task.

There is room for improvement in this sphere; and here I suggest a fertile field for study by computor and tabulator manufacturers, alternatively a numerical marking system which can be digested by existing machines and which would no doubt require negotiation and agreement between exporters, importers and carriers. Realising the difficulty of obtaining agreement to alter what is now a universal and accepted system of marks, it would appear that our best hope of finding a solution would be with the computor and tabulator manufacturers producing something new in this field.

Stowage Precautions

It is necessary to acquaint oneself with the characteristics of all items on board in order that appropriate stowage and treatment can be given. In addition to the precautions taken without injunction from manufacturers there is an increasing tendency for shipowners to receive requests for special stowage and treatment of certain items.

It is interesting to observe that controlled humidity of cargo spaces in vessels proceeding from temperate to tropical areas will not necessarily prevent, for example, rusting of tins of milk, particularly when the milk is cold and has been loaded during European winter conditions. Our observations are that this commodity does not readily absorb the atmospheric rise in temperature during a voyage to the Far East where it can arrive in perfect condition only to become saturated with atmospheric condensation immediately the hatches are opened. The answer to this is to heat the air gradually in the vicinity of the milk stowage at intervals throughout the voyage, arriving at destination with a hold temperature equal to that of the outside air in which circumstances condensation on the tins of milk does not take place when hatches are opened.

Here again careful consideration must be given to the positioning and separation of the variety of items which constitute a general cargo. It would obviously be folly to place cargo requiring warm stowage treatment in the same compartment as cargo requiring cool stowage. For instance, for chocolate to be discharged in perfect condition it must be kept dry and cool throughout the voyage.

The foregoing illustrates but two of the numerous examples of the complexities of stowing a general cargo liner whose cargo may include hazardous and inflammable items incompatible with each other, poisonous items which must be kept separate from foodstuffs, explosives requiring very special treatment, i.e. specially built magazines, radio active substances, e.g. isotopes which must be kept clear of living quarters, and as a matter of interest must be kept separate from photographic film which could be rendered useless if placed in close proximity.

In addition, of course, the stability and trim of the vessel must be given constant thought and attention during the loading, and the possibility kept in mind that cargo may have to be worked at intermediate ports throughout her voyage.

Solutions to Stowage Problems

In our industry as in others we constantly learn from experience and it is extraordinary how elusive, simple and effective solutions to stowage problems can be. I think the following two examples of simple answers being found to what appeared to us at the time to be difficult problems will be of interest. These examples concern the stowage of cement in paper bags and handling of unpacked cars.

Cement. On the voyages of our vessels to the Far East we invariably used to experience considerable breakage of bags. However carefully the bags of cement were handled and stowed

there was always, as was bound to happen, a settling down of bags in the hold owing to the movement of the ship in the seaway. The bags stowed at ship's side of course had to bear against the frames, cargo battens, cargo cleats, etc., and in consequence of the settling down and pressure from above much breakage of bags took place.

All of us appreciate that to remain competitive, exporters whenever possible should not be called upon to increase their standards of packing unduly, particularly if shipowners can assist by providing storage that will ensure satisfactory delivery with the same packing or for that matter less costly packing than hitherto used. In this case we found that by placing moderately priced and expendable hardboard in front of the cargo battens we provided a smooth surface, and an even distribution of weight was achieved which reduced breakage to an infinitesimal amount.

Unpacked Cars. Superficial damage to unpacked motor cars causes more illwill in respect of shippers and consignees than does almost any other damage. It is the constant aim of shipowners to find some method by which superficial damage can be reduced to a minimum. Various types of lashing and buffers have been tried out but, up to the present, we have not found one that has proved to be one hundred per cent efficient. It must be realised that if bad weather is encountered lashings are bound to stretch and the cars obtain too much play with consequent damage to themselves. In this connection the crew have frequently to inspect the lashings and tighten these whenever there has been some bad weather. We are still hoping to improve on our present methods, our chief difficulty being that cars cannot be lashed too rigidly, i.e., some slight movement is inevitable.

During the slinging and shipment of unpacked cars superficial damage such as scratches and dents was often done to the cars by the wire and rope legs attached to the base and spreaders of the car slings. Pieces of sacking used to be tied round the legs at certain points but these were not particularly successful and in the end the simple expedient of putting rubber tubing over the legs provided the answer. This may seem to be a very obvious answer to this particular problem but rubber tubing was only thought of after a great many years of unpacked car slinging. The reason why so often simple solutions are not thought of more readily is because everybody becomes so accustomed to a certain way of doing things and is so busy attending to his own particular job that invariably not sufficient thought is given to everyday problems.

Separation of Parcels

As time goes on, more and more trouble is experienced with our homeward cargoes from the Far East in respect of separation of parcels. When ships are loading at several ports for discharge at several ports in the U.K. and Continent, the stowage problem for our cargo officers is always present. In addition, more and more merchants desire delivery of their cargo to be given ex the ship and in consequence it must be well separated and made readily available.

Various methods are used to separate parcels. For timber, we have found that flat water paint, brushed over the planks, provides the best form of separation. As regards rubber we use strips of polythene sheeting, which material has the added advantage that it helps to counteract the sticking of the bales. As regards bagged cargoes, we used to use string separations which have obvious disadvantages in that strings get broken or cut by stevedores, so in consequence we are now experimenting with nylon nets. The size of the nets is 30-ft. x 12-ft. but they can be made to any size and we have thought it best to have the mesh only 1-in. square. The reason for this smallness of mesh is that we were somewhat worried in case stevedores might catch their feet in the larger mesh nets.

Nets of course have the advantages that they do not restrict ventilation ; being made of nylon they are very light, easily handled, do not rot and are very strong. The cost of these nets is something over £5 so that the cargo officers have to take good care of them. Nets of the fisherman variety can be acquired in Japan and Malaya. They are a mixture of nylon and some other substance, with about 60% nylon, and cost something under 30/-. We are still experimenting and it may well be that these cheaper fisherman nets will serve our purpose quite as well, and if so, we will probably use them extensively. In this connection we were endeavouring to find a solution to trouble experienced at certain ports where the discharge of rice parcels is carried out at night as well as during the day. We found that string separation was almost completely useless and that narrow strips of polythene proved to be much more helpful. However, we are hoping that the nets will be the best solution of all.

Documentation

We are continually faced with the handling and production of an increasing quantity of documents. Considerable study and thought has been given to the standardisation of certain forms, e.g. Bills of Lading and Shipping Notes. How much simpler it would be for shipper and shipping companies if one standard form with the requisite number of copies could be used as Shipping Note, Customs document, tally sheet, freight return and Bill of Lading, etc. The saving in clerical work would be appreciable and the possibility of error reduced.

Correspondence

During the past few weeks the Editor has received a number of letters commenting on articles which have appeared in recent issues of the Journal. Many are concerned with topical subjects of interest to a very wide readership. A selection appears below.

Transit Shed Loading Platforms

To the Editor of "The Dock and Harbour Authority."

Sir,

I wish to refer to the article by Mr. E. S. Tooth published in your March issue.

Mr. Tooth gives a description of the improvements made by the Port of London Authority in the handling of citrus fruit imports, which, it would seem, are partly due to the existence of loading platforms at the rear of the sheds.

It may interest your readers to learn that the Port of Rouen offers both types of arrangement, namely with and without a loading platform and in both cases, with excellent results.

1. When remodelling sheds U and V where citrus fruit imports are concentrated, considerable thought was given to the construction of a loading platform. The idea, however, was dismissed on account of the considerable amount of earth work involved, which was undesirable in view of the conditions obtaining in the vicinity of the sheds, and also because it was felt that a loading platform would affect unfavourably the flexibility of delivery to both lorries and railway box cars. Consideration was also given to the fact that outside the fruit season, from July through October, the sheds were to serve as general cargo sheds.

The sequence of operation is as follows:

Ships bring up to 1,300 tons of mixed cargoes, comprising citrus fruit and vegetables—mainly tomatoes and potatoes. According to the weight of the individual packages—11 kg. for tomatoes, 26 kg. and 34 kg. for citrus fruit—there may be some 40,000 to 55,000 packages, with a number of marks ranging up to 500.

The gangs in the holds of the ships are trained to make a preliminary sorting of the packages, loading simultaneously from 4 to 6 landing boards, one mark only to each landing board.

The crane picks up the landing boards in succession as they are ready, that is, when they are reasonably full and when no other package of the same mark is to be found in their immediate vicinity.

The landing boards are deposited by the crane on the quay* to be picked up by fork trucks and taken to the area of the shed assigned to each consignee of the cargo. A secondary sorting takes place at this time, according to sizes, usually three or four to each mark, the men in the shore gang carrying the goods to their stowages close to where the landing boards have been deposited.

Thanks to the sorting performed in the hold of the ship, the congestion which Mr. Tooth mentions, is entirely avoided and the following average speeds are achieved:

Small cases (average 11 kg.) 12 to 14 metric tons per hour or 1,100 to 1,300 packages per hour.

Cases (26 kg. and 34 kg.) 25 to 30 metric tons per hour or 750 to 900 packages per hour.

Approximately 80% of a ship load are offered for sale at the time of unloading. Sales and tendering to delivery vehicles follow unloading with a short time lag, e.g. at the beginning of the afternoon shift, when unloading starts in the morning. The lorries are standing tail-on about 15-ft. away from the rear of the shed, thus leaving a free passage for the fork trucks which shuttle back and forth between the piles and the lorries.

There are some 50 standing stations and an equal number of lorries can be loaded simultaneously. In addition to the standing stations, ample parking space is provided. The fork trucks carry their load on dock-tool pallets. Since the pallets are standardised, they are placed on the scales with the load on. Their weight is deducted automatically and does not appear on the weighing slip issued by the machines.

Three railway tracks are available on the other side of the road beyond the lorry standing area. The fork trucks gain access to the box cars placed on these tracks through traffic lanes where lorry standing is prohibited.

Had there been a loading platform, it would have been necessary to have had gaps in it to allow for the construction of ramps in lieu of the traffic lanes mentioned. It was thought however that such an arrangement would be inflexible—and experience might have proved that other traffic needed a different number of ramps. Further, the ramps would have been extremely steep, an undesirable condition for the safe operation of fork trucks.

Whether tendered to lorries or to box cars, pallets are deposited on the floor of the delivery vehicle by the fork trucks, which are therefore not delayed while the packages are removed from the pallets. As soon as the pallets are empty, they are pushed aside, to be picked up by the next loaded fork lift.

The activity of the delivering process can be gauged from the number of trucks and box cars to which the packages are tendered. In the example given above, that is, delivery starting at 1300 hours, the loading of some 120 lorries and 15 box cars is completed towards 1900 hours. Should a few delivery vehicles be lagging for some reason, there is the possibility of carrying on work during the night shift.

2. When it is possible to avoid interference between lorry and box car loading, a loading platform may be in order, even when most of the handling is accomplished mechanically. This is the case with the recent banana terminal, the entire floor of which is raised to the average level of box car and lorry floor. There are two loading railway tracks running inside the shed, one on the dock side, the other on the land side. Loading bays for lorries are provided at one of the gable ends of the shed.

Bananas are delivered into box cars and lorries on dock-tool pallets by low-lift trucks.

A complete shipload of some 1,400 tons of bananas—or 90,000 stems with up to 400 marks—is unloaded within 8 working hours, being sorted and sold immediately. When unloading starts in the morning, three-quarters of the entire shipload is dispatched the same day by 2300 hours.

These two examples are proof that Mr. Tooth's statement that the arrangement of sheds depends upon the kind of handling system, is entirely correct.

Very sincerely yours,

Port de Rouen, France. J. G. BAUDELAIRE.

Directeur du Port de Rouen, France.

*Whether close to the ship's side or to the shed depends on the area available on the apron and on the availability of fork trucks. Conditions will vary according to the quantity of goods already deposited inside the shed.

Integration of Transport Systems

To the Editor of "The Dock and Harbour Authority."

Sir,

The article in your May issue based upon a paper presented at the I.C.H.C.A. conference in New York last September will doubtless have attracted much comment. Although some of the argument may appear specious and partial, the theme in general is most usefully suggestive. The difficulty is that the subject opens up so many facets and invites so many questions that it is not easy to get to grips with it. Others may be encouraged to pinpoint the issues more exactly. In the meantime I make the following observations for what they are worth.

All land- or water-borne goods conveyances are in a sense containers, whether or not they embody their own prime movers. Separating the conveyance from the prime mover is always an attractive notion for securing a better utilisation of expensive equipment but its success depends on a reasonable harmonisation of loading and transit times which is often very difficult to achieve; otherwise we merely substitute demurrage on the conveyance for demurrage on the prime mover. With a number of conveyances in the train, however, the cargo can be worked on a broader front. In fact one suspects that the popular land semi-trailer adapted for "swinger" operations is used less for its primary advantages than for the benefits conferred by a better load distribution and manoeuvrability. Containers, in the sense in which we have come to employ the term, are goods conveyances intrinsically immobile, transferable from one mode of transport to another, large enough to contain a number of packages and with a practical upper limit of capacity of say, 1500-cu.ft. They have advantages and disadvantages of much the same order and a net economy in working may be correspondingly difficult to realise, for different but equally good reasons.

A transport tariff must be based upon the cost of providing and operating the equipment employed and, in terms of goods movement, upon the degree of effective utilisation of that equipment. The cost of providing a unit of cargo space is, broadly speaking, in inverse ratio to the volume of space provided. Putting on one side questions of convenience and whether or no they make a proportionate contribution towards the cost of the running surfaces they require, land vehicles must necessarily be less efficient as transport media than shipment by water and, on the whole they are less successful than ships in obtaining return loads. Any suggestion that a common tariff structure might apply to both land and sea transport is based on a fallacy, for entirely different criteria must apply to each. Considerations of space and weight tons have a different emphasis but they are not the only conditions.

Every carrier must make a judicious selection of merchandise in order to make an optimum use of his available space in both directions. The high tariff and its limited appeal to consignors of intrinsically or extrinsically high-value merchandise provides its own corrective, so long as shippers have an option to use a cheaper mode of transport. A simple form of weight tariff may be applied fairly enough to air cargo, for example. But as we approach nearer to fundamental transport needs the option narrows and the user of sea transport has no option at all except that allowed for in a weight or measurement tariff structure, which is valuable also to the carrier.

The other indispensible ingredient is the classification by commodities, each with its appropriate rate base. The concept that a tariff shall be adjusted to what the traffic will bear is unexceptionable. It carries with it the implication that high-value commodities shall subsidise the low—primary produce, generally speaking—and without it world economy would be utterly distorted. More specifically it is perhaps the principal effective means of ensuring reasonably full cargoes in both directions, by which manufactured and primary products both stand to gain.

In all cases the carrier must average the freight differentials to cover his outgoings and provide a margin for plant replacement and profit. The process of selecting and aggregating small consignments into larger ones is common to all systems. If containers are employed a new rigidity and an additional line of equipment is brought on to the scene and although there are considerable potential savings in some directions they may not be easily realisable by those who have furnished the risk capital, and then only on narrowly defined services. There ought, of course, to be incidental savings on covered storage and on packaging, but again one suspects that these would only be marginal. The real issue is whether demurrage on a vessel is strictly balanced by demurrage on the host of containers. On a particularly favourable route, for example, two specially designed and equipped ships might conceivably do the work of three normal vessels and against the saving by not providing and maintaining (but not steaming) one normal vessel must be put the cost of providing six times its capacity in less durable containers — a close-run thing, one might surmise. A well-designed container ship may not necessarily prove less serviceable for handling packaged cargo piecemeal; this might be a significant factor which would materially improve the economics of container working in its chosen field.

The important question, however, is to determine who should provide the movable equipment and whether the selecting and aggregating of cargo is to be performed by forwarding agents or by the carrier? In the first eventuality much of the established business of the carrier offering a scheduled service in canvassing cargo and formulating a developed rate base in conference with others will devolve upon the forwarding agent, an intermediary who, after the fashion of the Post Office can charge goods owners on one scale and secure an agreement with the carrier on another. The provision of a bottom then becomes essentially a charter operation and it might even be that the essential instrument of international commerce—the negotiable Bill of Lading—would be placed in jeopardy. One would very much deplore such a development and the impact it might have upon the liner trade, which, on balance, has served the community extraordinarily well. If precedent is anything to go by, however, the forwarding agent might become the subsidiary of the carrier which would approximate to the obvious and best alternative: for the ocean carriers themselves to promote the use of container services wherever on a sober judgment they appear economically viable, and to enter into agency agreement with inland carriers for through services where opportunities present themselves, in the absence of which the "point of rest" principle will prevail. Such a course will necessarily demand a surrender on their part of those long-cherished restrictions which are neither in their own best interest nor in that of the commerce which they serve.

All that has been said (much of it obvious and self evident) will illustrate the difficulty of writing constructively yet concisely on any transport topic. The ramifications of transport practice cannot indeed be made into a formal study for—like geography—no sooner does one begin to probe into it than it turns into something else.

Yours faithfully,

Maresfield, Sussex. P.A.T.C.
5th June, 1961.

Why Not Abolish Tallying?

To the Editor of "The Dock and Harbour Authority."

Sir,

In his article under this heading in your issue of May, 1961, "Poseidon" implies that one reason why tallying is performed in our ports is "custom and practice." Although this may be true in some instances, there must be many circumstances in which tallying is necessary. Goods change custody a number of times between sender and receiver and as each organisation in turn accepts responsibility for them, it is usually important for quantity and condition to be established.

Be that as it may, it is probable that the **shipper** would usually prefer authentic tallies to be taken at the various points where his consignments change custody. If he sends 50 cases to a receiver on the other side of the world, he wants 50 cases to reach their destination. The less frequently the consignment is tallied en route, the more likely will part of it disappear and it is no satisfaction to the shipper, when he loses his customer because his order is short-delivered, to be told that the shipping company prefers to meet his claim rather than pay the cost of tallying.

The point being made is that tallying is not only a procedure with the short term implication of protection against claims, it is often also an element in the maintenance of goodwill.

Yours faithfully,

London, E.16. Cargo Superintendent.
5th June, 1961.

Sir,

The article by "Poseidon" in your May issue is a ponderable argument, and will no doubt be endorsed or condemned by many. The former will be those, who, from time to time, have experienced frustration by the so-called recording of cargo transported from one place to another; it necessarily follows that the latter will be a very small minority indeed.

What is the value of a tally? What element of chance does the result contain? Those who uphold this ancient practice should at least have practical experience by attempting—if only for a brief period—to record a movement themselves. Tallying sounds simple, but it is dreadfully monotonous. Even the simple task of recording the number of packages tipped one by one into an ordinary net sling for shipment, recorded by the old method of a "gate" tally, can, by its very monotony, create confusion as to whether one package has been, or is to be noted on the tally sheet. One error renders the value of the tally something less than the paper it is written on, and sometimes leads to that most unsatisfactory clause "in dispute, if on board to be delivered."

The aspect of "personal interest" is of great significance; the tendency is to follow the interests of the employer by agreeing the tally with the manifest, delivery order, shipping note etc.. It would be difficult to assess the percentage of genuine tallies con-

scientiously and assiduously recorded. Even given those qualities, the element of human error must affect the final result.

It is the practice of at least one authority to tally from vehicle to shed, but not from shed to ship. It would appear that the assumption is, what goes into the shed, goes into the ship. The question immediately arises, does it? In any case the second operation reduces the original tally to a minimum value.

The abolition of tallying is by no means a new idea. It has been successfully discarded by at least one port authority. Initiated by a clerical strike lasting for many weeks, one claim amounting to only about £5, was accepted and met, for the whole period. In fairness it must be stated that the whole project was made easier by the constant vigilance of the port's extremely efficient police force within the sheds and at the outward gates. The labour was paid on a day time basis, plus an incentive bonus, similar to that of Liverpool, and this practice has continued. As "Poseidon" states, the manifest, stowage plan, etc., are all available, why not use them?

My congratulations to "Poseidon" for boldly tackling a matter that should have received attention many years ago. I hope we shall hear more of this subject, with definite results.

Yours faithfully,

Henfield, Sussex. SAMPAI HATA.
6th June, 1961.

Sir,

In the light of the ever recurring stoppages in the docks one can understand that "Poseidon" should cast around in an endeavour to eliminate one or more causes of these very serious interruptions in the nation's import and export trades, but he must be careful in so doing, not to "empty the baby out with the bath."

Tallying of cargo in these modern days is not just a matter of putting down on a card strokes for the number of bags, bales or drums handled, but it embraces the identification, selection and correct delivery of a multitude of miscellaneous packages. If tally clerks did not perform this essential duty, then someone else would have to do so, if only to avoid endless delays, disputes and commercial litigation.

Whilst it is true that a proportion of tally work in such a port as London concerns the recording of goods handled for the piecework payment to gangs and, in fact, in pre-war days, that much of this checking was done — in a rather inefficient and casual manner—by the hatchwayman himself, Poseidon's "winch-end tally," today piecework has been extended to every commodity discharged or loaded in the major ports, and the very complicated piecework schedules embrace many hundreds of different items and varieties of cargo in the London Ocean Trades alone. By joint agreement, a gang is entitled to a comprehensive "tick note" for its day's work in order that the correct piecework payment can be made. There is now no question of running one day's work into another for the purpose of such payment. Each day or period must stand on its own. Any abandonment of such an established and necessary practice would tend to remove incentive, decrease output and inevitably lead to a deal of labour trouble which is the very thing Poseidon is hoping to minimise.

But, quite apart from piecework tallying, ports such as London and Hull are "overside" ports where half of the ship's cargo may be discharged into or loaded from barges. The lightermen's entitlement to goods rests in the documents he has produced to the shipowner's representative and to H.M. Customs. In fact, the tally overside is both the shipowner's clearance of the goods carried under his Bill of Lading and the barge's clearance from the dock. Without a record of quantity, without a scrutiny and ensurement that the right packages were being delivered to craft, complications would ensue which all the goodwill in the world would not put right. No question of "smart boy" claims, isolated or easily recognised, here!

Then again, vast quantities of goods, homogeneous and miscellaneous, are landed into transit sheds for subsequent delivery to road or rail, and are so delivered on the authority of delivery documents received by the Port Authority, Wharfinger or Master Porter. In London under the Quay and Shed Space Agreement, the shipowner, whilst performing such landside deliveries, also has the right to land overside cargo which finally his labour delivers to barges from the shed; both categories of cargo—landside and waterside — reside temporarily cheek by jowl, in the transit shed. The recognition, segregation and final checking of such goods, many of them often of a highly miscellaneous nature, can be a complicated task and must be performed by persons familiar with this specialised work when the goods finally leave the transit shed.

In the reverse, all exports received for shipment, either into the transit shed for loading into the ship, or direct into the vessel from barge overside, must be checked and receipts given.

It must be repeated that someone must do these things and the idea of doing away with all recording in order to preserve industrial peace would lead to considerably more trouble—both industrially and legally—than is ever experienced at the present time.

No, Poseidon must surely think again!

30-34 Mincing Lane, Yours faithfully,
London, E.C.3. J. A. WATSON.
8th June, 1961.

Sir,

I cannot help thinking that "Poseidon" had his tongue well and truly in his cheek when he submitted his article to you entitled "Why not abolish tallying?"

The cost of tallying and ancillary clerical operations in the Port of London today is very much in line with the figures suggested by "Poseidon" and so from the shipowners' point of view the thought of abolishing tallying is at once a very attractive prospect. Even more attractive is the thought that no longer would we have to deal with a body in the shipping industry which has been, for one reason or another, an additional source of delays in the turn-round of vessels. The delays I have in mind are, of course, such as the recent tally clerks' strike and similar disputes in the West India Dock and, furthermore, those occasions when a stevedoring gang could be obtained but could not be employed owing to the fact that, due to a temporary shortage, no clerk was available either for tallying piecework or for delivery.

Whilst I agree wholeheartedly with "Poseidon" that one should not simply accept the requirement of the employment of tally clerks just because it has always been practice to do so, one must realise and face up to certain difficulties that would ensue if tally clerks were done away with. A liner company exists primarily to deal with large quantities of general cargo and it is not an infrequent occurrence to find that a parcel of only one or two hundred tons of some particular commodity might well be covered by a dozen or more Bills of Lading. The cases or bags may well appear identical with each Bill of Lading quantity only indentifiable from the next by sub-marks. The commodity might be sold on the appropriate market in small lots with the result that a dozen different merchants apply each for a Bill of Lading parcel, or it may even be that each Bill of Lading is further subdivided into part-lots against which delivery orders are issued by the original consignee. Without good and efficient tallymen, how would "Poseidon" suggest the shipowner could hope to deliver each parcel to the merchant requiring to take delivery? Surely each merchant is not really concerned with a "gentleman's agreement" as to whether he is likely to have a few bags over or short of his parcel, nor is he interested in having a few bags of

another lot number which may well cover a different grade of his particular commodity. He has a document that calls for X number of bags of Mark Y. He just wants X number of bags of Mark Y and not a number of bags of Mark Y and a few marked Z as well. The integrity of the steamship business in this country —and I submit it has never been higher than it is today—is based on the fact that the shipowners do genuinely try to live up to their obligations in full measure. In doing this, I consider they must have the assistance of first-class tallymen.

Next, "Poseidon" proposes that we should pay the piecework or bonus earnings of the men working the cargo by reference to the Stowage Plan, Ship's Manifest and so forth. In over thirty years in the industry, I have yet to see a stowage plan or ship's manifest which would give me the slightest indication of the tonnage that any particular gang would be likely to handle when you have a hatch "double-banked," i.e. two gangs working in the same hatch. One gang might easily handle twice the dead-weight tonnage of the other gang but the gang with the lower tonnage could well have been handling a commodity which, due to its weight, shape or size, could not be discharged as fast as the commodity handled by the other gang in the hatch. You simply must have somebody recording what each gang is doing in order to establish the proper payment for the work performed.

I agree that most of the objections to the abolition of tallying on the grounds of a possible increase in the number of claims and the attitude of H.M. Customs can well be discounted but I do not think his point about the recording of damage is such a good one. "Poseidon" suggests that instead of having a tally clerk recording damage, the services of a qualified surveying officer would be employed. What is the point here? A qualified surveyor is at present employed to report in detail on damage done to some particular consignment or consignments. Acting in this capacity, the surveyor can spend a great deal of time looking at one or two particular parcels. If you had to rely on surveyors instead of tally clerks, a great number of surveyors would have to be employed and I submit the result would be that the expenditure on surveyors would probably amount to more than the saving in the abolition of tally clerks. Again, "Poseidon" refers to the large number of motor cars that are exported these days and which are separately documented. He asks, what is the point of making a tally of these? Again it is a question from the shipowner's point of view of recording the condition of the car at the time it is received for shipment. If you had no tally clerk, you would have to employ a surveyor or else have some other means of recording the scratches, dents, bumps, etc. which so often are present when automobiles are tendered for shipment. If these are not recorded at time of receipt, the shipowner stands liable to face a claim from the receiver at destination. Again you would have the choice between a surveyor and a tally clerk and I submit the tally clerk is infinitely cheaper.

On the whole, I cannot agree that "Poseidon" has made out a case at all for abolishing tallying and without being in any way a member of the "peace at any price" school, I submit it is not in the interests of shipowners in general that the employment of tally clerks should be dispensed with. Quite to the contrary, in my view we should be going all out to encourage the best type of man we can obtain to take up tallying as a profession and do everything possible to raise the standard of the work performed.

Yours faithfully,

T. E. COOK.
Asst. European
Operating Manager.

United States Lines,
58 St. James' Street,
London, S.W.1.
8th June, 1961.

Baltic and International Maritime Conference

The General Meeting in Rome

(By a Special Correspondent)

The general meeting of the Baltic and International Maritime Conference held in Rome last month was attended by representatives from some 40 countries and was a happy combination of business and social activities. The Conference deals largely with the documentary side of ship operation and its membership comprises not only shipowners interested in the Baltic trades, but shipbrokers as well. The chairman, who holds office for two years, was Mr. R. F. Scovell, of the Currie Line, Leith, and he has now been succeeded by Mr. J. G. A. Fontein, of Rotterdam.

Papers read at the conference covered a wide field and all impinged, in greater or less degree, on the functions of dock and harbour authorities. At the opening meeting there was a lecture on "The possibilities and limits of international maritime organisations" by Prof. Avv. Mario Scerni, of the University of Genoa. It was concerned, of course, largely with the setting up of the Inter-Governmental Maritime Consultative Organisation and he reached the conclusion that the right path had been taken. There was now an international maritime organisation at government level, carrying out its task with general consensus of approval and there was also, as in the past, a net of non-official international bodies with their own scopes and responsibilities, fully independent from government influences. Maritime affairs, he argued, are of such a complex nature that there are ample possibilities both for governmental and non-governmental bodies.

The conference turned from this picture of peaceful co-existence to a paper on "Shipping in the Mediterranean, with particular reference to Italy," by Mr. Giamico Clerici, president of "Federagenti," Genoa. His thesis was that Italy represents the most typical and significant instance of the new stage which the Mediterranean area is experiencing as a centre of maritime-commercial traffic as a consequence of the economic and industrial development of the countries placed around it. He pointed not only to the 100 million tons and over of traffic of the Italian ports as representing the most important national contribution to the total commercial traffic of the whole area, but to the very large economic and industrial development experienced by Italy from the end of the period of post-war reconstruction up to the present.

At the next open meeting Mr. W. H. Pawley, the Deputy Director of the Programme and Budgetary Service of the Food and Agriculture Organisation of the United Nations in Rome, spoke on "The growth of world population in relation to world crops." He urged that the real problem with which the world was faced was the ability of food production as a whole not only to keep pace with population growth but to provide more adequate and better balanced diets in under-developed regions.

The issue, he asserted, was certainly one of the most pressing which was facing mankind to-day. If we and our children were so fortunate as to avoid nuclear destruction, from the vantage point of history 50 or 100 years from now the question of the race between population and food production would loom as the major issue of the latter half of the 20th century—an issue against which the cold war which so dominated our thinking at the present might shrink into significance.

Having chilled the blood of his audience with these grim warnings, Mr. Pawley went on to discuss the possibilities of increased food production, of extending the area under cultiva-

tion, of the more intensive use of land, of raising yields and of the potentialities of fisheries. He said that the existence of large untapped resources of nature and knowledge represented a challenge to the ability and goodwill of men to solve a problem which was capable of solution. They did not, however, constitute any guarantee of success and least of all a cause for satisfaction with our current rate of progress.

On this slightly more optimistic note and with the thought that whatever happens in the future ships will be required to carry foodstuffs here and there, the conference next had its attention drawn to "Problems confronting foreign shipowners whose ships call at Italian ports." This was contributed by Avv. Aldo Mordiglia, of Genoa, who, besides being a lawyer is a Protection and Indemnity Club correspondent. As he explained, his experience was confined to legal problems and he did not consider such matters as tariffs, congestion, etc., except insofar as these might give rise to legal questions.

The speaker therefore posed a series of questions and then by providing the answers put his audience in possession of a vast amount of useful information. On Italian maritime law he said that the Italian Code of Navigation embraced the entire field of maritime and inland water navigation, as well as navigation by air. This code also regulated the public aspects of navigation, including those which were connected with Italian ports.

Italy, he added, had ratified the principal international maritime conventions. Furthermore, the code had incorporated the main principles of such conventions in Italian national law. It was also to be emphasised that in order to solve the conflicts with foreign legislations, the Italian code generally applied the law of the ship's flag. In general the speaker felt that, even if Italian ports were still confronted with many difficult technical problems, the situation regarding the ports at least as far as legal problems were concerned was not unsatisfactory.

At the final meeting the assembly was welcomed and addressed by the Italian Minister of Mercantile Marine, Senatore Avv. Angelo Raffaele Jervolino. Mr. Scovell, the president of the conference, followed with his presidential address, which was also his swan song. His main theme was that the shipbuilding capacity of the world far exceeded all possible peacetime needs, but the danger was that governments, in their anxiety to avoid unemployment in the shipyards, would apply artificial expedients which, in the long run, would lead to the continued unbalance of shipbuilding capacity and the realistic needs for new tonnage.

The population of the world was increasing at a startling rate and there was the steady rise in the standard of living which was certainly needed in certain parts of the world. These developments were bound to result, in due course, in increased demands for shipping, but he was not prepared to make a forecast of the number of ships which would equate the demand with supply two years hence.

Mr. Scovell referred to two miscalculations about trade: the statement of O.E.E.C. experts that the world would require vast quantities of coal from North America for many years—many shipowners ordered ships on the strength of the report, but the flow of coal from Hampton Roads to Europe was now a mere trickle—and the belief of the major oil companies that there was bound to be an insatiable demand for tankers, whereas the yearly increase in the world consumption of oil had remained comparatively steady.

"We are living in an age of great achievements in science and technology," Mr. Scovell concluded. "Shipping and its allied services will require to keep abreast of modern development and to take advantage to the utmost extent of research. We must be as efficient in our respective walks of life as any other industry. We serve international trade and our success will depend upon the services we are able to give."

Mr. F. P. Longton, of London, who is chairman of the executive committee, presented the annual report which, he said, showed that world trade was expanding—scant consolation to shipping if concurrently with that expansion of trade there was an even greater disproportionate growth in world tonnage. A long period of unremunerative freights had quite naturally made owners turn their minds to remedial methods, i.e., scrapping or laying-up pool schemes. Plans for such a pool had been discussed in regard to coasters, and in London the framework was already in existence for a pool covering deep-sea tonnage. In the tanker world, the International Tanker Owners' Association in London was a medium for the international exchange of views between independent tanker owners. Tanker freights had worsened and it was no wonder, therefore, that rumours were heard of a desire for some revival of the Schierwater scheme or something of a similar nature.

Following the election of Mr. Fontein as president of the conference for the next two years, Mr. J. C. H. Peugniez (Paris) was elected president-designate. The four vice-presidents, Mr. Erik Brodin (Stockholm), Col. W. L. Denholm (Glasgow), Mr. Thomas Entz (Rendsburg) and Mr. H. Kuhnle, jr. (Bergen) were re-elected and Mr. Pierre Vieljeux (Paris) was also elected a vice-president.

The final paper was on "The economic aspects of flag discrimination" and was read by Dr. J. J. Oyevaar, chairman of the Maritime Transport Committee of O.E.E.C. He said that flag discrimination in its simplest definition was action by a government to influence cargo to be shipped by vessels under a particular flag, such as its own. Shippers were, in that manner, forced to ship by certain vessels, not because they could expect better treatment or cheaper freight rates, but merely because the vessel carried a certain flag. Such a nation's vessels thereby obtained more cargo, and the vessels of other nations less, than they would have been able to secure by their owners' own efforts or on their merits.

There was much more at stake than a little gain by the one, a little loss by the other. In the final analysis they were faced with the agonising question whether international shipping would survive as a form of private enterprise, to the benefit of world economy in general, or whether the merchant navies of the world would become bureaucratic appendices and state-controlled instruments of national policy-making.

He was puzzled as to how a future historian would deal with what appeared to be a paradoxical situation. Whereas the western world had long abandoned the "mercantilistic" system and, in fact, since World War II was making strenuous efforts towards an ever-growing liberalisation of the international exchange of goods, capital and labour, in world-shipping—which was essentially of an international character—strong tendencies were at work in the opposite direction.

However, after an exhaustive review of the situation in various countries, Dr. Oyevaar revealed that he was not despondent, not even pessimistic, about flag discrimination. He believed in the wisdom of man and he had great faith in the possibilities of streamlining current views which were here and there conflicting in the new O.E.C.D. (the successor to O.E.E.C.) once it got down to business.

Reconstruction of Wharves at Suva.

The United Kingdom recently made a grant of £1,143,000 to the Fiji Islands to improve wharf facilities at Suva. The Kings Wharf, built of timber in 1917 is to be replaced by a 1,600-ft.-long berth with greater depth of water to avoid maintenance dredging. The existing Princes Wharf is to be reconstructed to provide a 450-ft.-long berth, and a new wharf, 600-ft.-long, is to be built at Walvis Bay. Other new facilities include a banana and transit sheds, and oil pipelines.

Report on U.K. Dock Labour

Improvement in Level of Employment in 1960

The Report for 1960 of the National Dock Labour Board, published recently, states that the more satisfactory level of employment at the end of 1959, referred to in the previous Report, was maintained during 1960, and there appeared to be further improvement towards the end of the year. The total result of the year's working can be broadly assessed from the aggregate of normal turns worked, which exceeded the 1959 figure by 4·4%.

Increased Labour Strength

Early in the year authority was given by the National Board for interim adjustments, permitting increases in registers. The prospects of a continuing recovery in the volume of trade were particularly apparent in the larger port areas, and when the first half-yearly review of sanctioned strength was carried out in March it was essential to give special consideration to the adequacy of the labour force in the summer months when almost 8% of the workers would be on holiday. The outcome of the review was a further increase of 2,050 men in the authorised strength of main and probationary registers. A further adjustment was approved at the November review, when the sanctioned strength was increased to a total of 74,772. The number actually employed on the main and probationary registers at the end of 1960 totalled 73,144.

The analysis of intake and outflow shows a net increase for the first time since 1955, applying in some measure to each of the main, probationary and seasonal registers. The most significant feature of the analysis is that only 335 men retired from main registers, compared with 668, 918 and 719 in the three previous years; this marked change was undoubtedly due to the imminent introduction of a pension scheme for dock workers.

With the expansion of registers during the year, there were further opportunities for developing the principle of probationary service for new entrants and most of the recruitment was to probationary registers which 14 Local Boards now operate.

Although there was a further fall in the average number of weekly workers, from 16,596 in 1959 to 16,382 (representing 22·6% of the workers' register), the actual number at the end of the year was 16,570 as against 16,383 at the end of 1959. Most of this increase occurred in the second half of the year, there having previously been a downward trend. Viewed as a whole these figures have in recent years been a roughly stable proportion of the total register.

The foregoing figures emphasise the improvement in dock employment as it will be seen that, whilst there was an increase in the average workers' register, there was a greater advance in the average numbers of those employed. As a result there was a marked drop in the numbers proving attendance, and the proportion (6·42%) of the register is the lowest recorded since 1955.

The average number of men absent through injury rose from 489 in 1959 to 530. These figures suggest a significant increase in the incidence of accidents though it will be appreciated that they have to be viewed in relation to the increase in the average number in daily employment. Much more detailed research would be needed before reasons for this development could be stated with certainty; such research would call for investigation of the effect of recent recruitment, changes in the relative proportions of different types of cargo from one year to another, the volume of work undertaken during overtime periods, the degree of congestion, and so on.

Once again the Board's liability for attendance money payments fell in consequence of the lower numbers of men proving attendance, and the total cost of £785,591 compares with £1,226,432 in 1959 and £1,462,530 in 1958. There was also a fall in payments of guarantee make-up from £209,795 in 1959 to £174,671, but a direct comparison cannot be made with the fall in provings because of the introduction of higher rates of guaranteed weekly payments from 2nd May, and a new agreement providing for increased wages from 29th August.

Labour Disputes

Unfortunately the year was marred by disputes involving the total loss of 245,813 man/days.

This total represents the loss of potential labour by men directly involved, but it must be emphasised that in the case of the ocean shipowners' tally clerks' strike in London in September/October when 32,904 man/days were contributed to the total, far greater numbers of other registered dock workers were unable to work. This particular dispute, in which a decision of the London Dock Labour Board to increase the register of tally clerks was challenged, led to the decision to appoint a Committee of Inquiry under the Chairmanship of Mr. H. Lloyd-Williams, C.B.E., D.S.O., M.C., to "consider the difficulties which have arisen in the Port of London concerning ocean shipowners' tally clerks." The report of the Committee was published on 25th November, 1960, and the Board was greatly encouraged both by its forthright terms and by the frank recognition of the obstacles which the London Dock Labour Board had met in the execution of its statutory task. The Committee made a number of recommendations which they felt "might go some way towards ensuring the smoother working of the port whilst, at the same time, safeguarding the legitimate interests both of the tally clerks and of their fellow workers," and at the end of the year the National and London Boards were giving urgent consideration to the steps which might be taken in the light of those recommendations.

The biggest direct loss of 118,054 man/days arose from dissatisfaction with the progress of a national wage claim, and affected the ports of London, Liverpool, Birkenhead, Garston and Manchester on various dates between 20th June and 23rd August.

In Hull 35,485 man/days were lost when there was a further dispute over the traditional scoop-and-basket method of unloading cotton seed; this port was also the scene of two one-day token stoppages in November/December in protest against the number of weekly workers in relation to the size of the register. For some years the proportion of such men to the total has been above the level pertaining elsewhere, without however previously exciting undue comment. Certainly there was some slight advance in 1960, but neither in numbers nor as a proportion of the whole did this bring the position to that claimed by those organising the protest. It is a matter of real difficulty to reconcile the employers' apparent right under the Scheme to engage registered weekly workers, with the Board's responsibilities for ensuring greater regularity of employment for the register as a whole. Equally, it is impossible to say with absolute certainty at what level the number of weekly workers in a port becomes prejudicial to the interests of men in the reserve pool. Discussions on these matters were, however, continuing with the Local Port Working Committee at the end of the year.

Earnings of Daily Workers

The average weekly gross earnings of daily workers, with comparative figures for 1959 were as follows:

Period	Wages	Attendance money	Guarantee make-up	Holiday pay	Travel and dead time	earnings Gross
	£ s. d.	s. d.	s. d.	s. d.	d.	£ s. d.
1959 ...	13 10 6	9 2	1 7	10 7	7	14 12 5
1960—Qtr.:						
I ...	15 5 11	7 5	1 0	4	9	15 15 5
II ...	14 3 7	5 10	9	16 6	8	15 7 4
III ...	14 12 8	4 3	1 0	18 1	10	15 16 10
IV ...	15 14 9	5 11	2 4	6 9	9	16 10 6
1960 ...	14 19 2	5 10	1 3	10 6	10	15 17 7

Whilst the wage award effective from 29th August had some effect, the increase recorded arose primarily from the greater total volume of employment and improved regularity of work for the individual dock worker.

This improvement for the individual naturally resulted in lower average payments of attendance money and guarantee make-up; and the increased use of transferred labour has inevitably meant a higher average payment for travel and dead time. The slight downward movement of average holiday pay arises from the recruitment during the year, as new entrants to the register after 31st March had a reduced entitlement according to their date of commencement.

Pension and Training Schemes

Two developments of considerable importance to the operation of the Dock Labour Scheme during the year were the agreement to introduce a pension scheme for dock workers, and to establish in London and Liverpool pilot schemes for the training of new entrants to the register.

In February, the National Joint Council for the Port Transport Industry, which in the previous autumn had agreed in principle to a pension scheme for dock workers, asked the National Board to co-operate in its administration. Consultations took place to ensure that the necessary legal steps were taken to enable the scheme to be brought into operation and a special Act of Parliament was passed and an amendment to the 1947 Dock Labour Scheme introduced. The work was completed in time for the scheme to commence on 1st January, 1961.

In July the National Joint Council approached the Board concerning the setting up of pilot training schemes in London and Liverpool. The Board accepted the invitation to be responsible for the provision of the necessary finance, premises and staff, in accordance with basic proposals already drawn up by the Council, who had also appointed special Sub-Committees in each port to carry out preliminary investigations.

The Board immediately gave instructions for possible sites for the training premises to be examined, and for the appointment of permanent staff at each training centre to be proceeded with; details were settled in close consultation with the Council, and by the end of the year Chief Instructors had been appointed for both ports, negotiations had been completed for work to commence on 2nd January, 1961, on the adaptation of premises in Liverpool, and preparations were well ahead for similar work to start shortly afterwards on a building in London.

In accordance with the training proposals approved by the National Joint Council, a National Training Committee was appointed consisting of representatives of Port Employers, Trade Unions and the National Board, and Port Training Committees, similarly constituted, were appointed in London and Liverpool. The National Committee, which held it first meeting in December, will act as the advisory co-ordinating body, facilitating the exchange of experience, whilst the Port Committees will be responsible for the actual operation of the training schools, including supervision of the work of the permanent staff.

Once the schools open, every new entrant in these ports will normally be required to pass the training course before being accepted as a registered dock worker. The curriculum and the length of course will be varied in the light of experience, and according to the rate of recruitment required to meet the needs of the port, but initially it is anticipated that the course will last three weeks. Whilst it will include lectures on the Dock Labour Scheme port facilities, industrial organisation and procedure, and other relevant subjects, the main emphasis will be on practical instruction in safe and efficient methods of cargo handling and the operation of mechanical equipment.

Improved Financial Position

An improved level of employment had been forecast in the Board's budget for 1960; and this was expected to produce a surplus on management fund sufficient to begin replenishing the levy stabilisation fund after the heavy calls made upon it during the four previous years. At the normal review in May, it was therefore decided to leave the rates of percentage payments unchanged.

Later in the year, the Board considered its future requirements having regard to the introduction of the graduated pension scheme in April, 1961, and its responsibility, as agents of the Port Employers and Registered Dock Workers Pension Scheme, for collecting the contributions of registered employers to that scheme.

As the result, new rates of levy were announced in November, which raised the rates of percentage payments. These changes did not, however, come into operation until the beginning of the new year, and did not therefore affect the accounts for 1960.

The total income from percentage payments, etc., for 1960 at £6,069,327 was over £600,000 higher than in 1959; and while this was to be expected in the light of the prevailing conditions, it was of course partly attributable to the higher rates of wages payable in the last 18 weeks. Accumulating surpluses on management fund made more money available for short-term investment and this helped to increase the investment income which also benefited from better profits on sale.

Consequently, after making the customary allocations to general welfare fund of £276,105 representing ½ per cent on the wages of all dock workers; and £2,641 from investment income, to meet education costs, the net income to the management fund was £5,893,942 as against £5,263,606 in the previous year.

Total operating costs were some £98,000 lower at £5,601,053, an increase in capital costs of about £242,500 being more than offset by a fall in ordinary expenditure of about £340,000.

Manufacturers' Announcements

Dock Fenders for Turkey

A large export order of rubber dock fendering received by The Goodyear Tyre and Rubber Company (Great Britain) Limited, recently left the Wolverhampton Factory en route for Mersin, in Turkey.

Weighing in total some 80 tons, the order consisted of 3,614-ft. of 12-in. o.d. x 6-in. i.d. cylindrical fendering, for the most part in 10-ft. lengths, and 2,888-ft. of 6-in. o.d. x 3-in. i.d. fendering.

Mersin is an entirely new harbour, designed and constructed by the Royal Netherlands Harbour Works Company, of Amsterdam, Holland.

Thames Fire Boat Fitted with River Radar

A high definition Decca radar, type 215, has been installed in the latest fire fighting vessel to come into service in the lower reaches of the Thames and the Thames Estuary. The "Fireflair," a 66-ft. firefloat is based near Gravesend and is available for fighting fires in shipping on the river, as well as for riverside fires on both the Kent and Essex shores.

This is the first time that radar has been specified by a local fire service in England for a vessel of this type. Radar information will enable "Fireflair" to answer emergency calls more rapidly in all conditions of visibility, including darkness and bad weather. Among other fire fighting vessels employing similar radar are nine tenders of the New York fire department.

The "Fireflair" is financed jointly by the Essex and Kent County Councils as part of their fire cover responsibilities, and is manned by personnel of the Kent Fire Brigade.

Manufacturers' Announcements—continued

Reciprocal Agreement between U.S. Companies

F. A. Hughes and Co. Limited who introduced the use of commercially practicable cathodic protection schemes in the U.K. recently announced that an agreement has been signed between them and Engelhard Industries Inc. of New Jersey, under which F. A. Hughes and Co. Limited become the sole U.K. and Western Europe licensees and agents for "Capac" Automatic Impressed Current protection, and Engelhard Industries Inc. become the sole United States and Canadian licensees and agents for the "Toxion" Anti-Fouling System. This agreement should prove beneficial to both Companies and their customers in that there will be a complete interchange of technical knowledge.

A Steel Bridge Floated by Sea to London

A pre-fabricated welded steel bridge, weighing nearly 200 tons, built by Head Wrightson Teesdale Ltd., at their works on the River Tees was recently floated by sea down the East Coast of Britain to the Regents Canal Dock in London, a journey of three days. The Port of London Authority lifted the bridge into position on arrival.

It is believed that this was the first time a bridge has been despatched such a distance in this manner and it was specifically designed as a seaworthy pontoon in order to avoid jamming the roads with heavy pieces of equipment and so that the bridge could be built in Head Wrightson's own workshops, giving greater control over the manufacture.

The swing bridge is of box type construction, 135-ft. long by 32-ft. wide and will be used to carry both pedestrians and motor traffic over the entrance to the Regents Canal Dock. British Waterways are sharing the cost of the new bridge with the London County Council.

CLASSIFIED ADVERTISEMENTS

Rates 4s. per line (minimum 8s.); Box Number 2s. extra: Rate for single column inch is £2 per inch. Prepayment of classified advertisements is requested. Orders should be sent to Advertisement Department. "The Dock and Harbour Authority." 19. Harcourt Street. London. W.1. Telephone: PAD 0077.

FOR SALE

PATENT No. 793,414 entitled "Bollard with a Detachable Post" is for sale or licence. For details apply to CHATWIN & COMPANY, Chartered Patent Agents, 253 Gray's Inn Road, London, W.C.1.

TENDERS INVITED

DISPOSAL OF DIPPER DREDGER "WALRUS" AND ROCK CUTTER "NAUTILUS" BELONGING TO THE TRUSTEES OF THE PORT OF BOMBAY

B.P.T. STORES DEPARTMENT

TENDER NOTICE

Sealed tenders will be received by the Controller of Stores, Bombay Port Trust at his office at Clarke Bunder, Mazagon, Bombay 10 up to 3.00 p.m. on Tuesday, the 29th August 1961, for the purchase from this Administration of Dipper Dredger "Walrus" and Rock Cutter "Nautilus" approximate particulars being as under:—

(1) **D.D. "Walrus":**
Length B.P. 110-ft.
Breadth moulded 38-ft.
Depth moulded 10-ft.
Draft mean 4-ft. 1½-in.

(2) **R.C. "Nautilus":**
Length B.P. 110-ft.
Breadth moulded 33-ft.
Depth moulded 9-ft.
Draft mean 5-ft.

Tender forms giving full particulars and conditions can be obtained from his office on payment of Rs. 5/- per copy which will not be refunded. Tender forms will not be sent per V.P.P.

No tender will be considered which is not made on the prescribed form and which is not accompanied by a copy of the receipt for the sum of Rs. 2,000/- which sum should be deposited in his office as earnest money. The earnest money will be refunded to the unsuccessful tenderers.

The Tenders will be opened at 3.30 p.m. (S.T.) on the same day in the presence of such of the tenderers or their representatives who may wish to be present.

SITUATION VACANT

UNIVERSITY OF MELBOURNE
LECTURER IN CIVIL ENGINEERING (HYDRAULICS)

Applications are invited for the above-mentioned position.

Experience in teaching, research and in the design and construction of hydraulic works and apparatus are desirable qualifications.

The salary range is £A1,660 to £2,360 per annum. Initial salary will be determined according to qualifications and experience. Superannuation similar to F.S.S.U. in Great Britain will be provided.

Conditions of appointment may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close, in Australia and London, on **4th August, 1961.**

URGENTLY REQUIRED

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approximately 1000 H.P.

SELF-PROPELLED SUCTION DREDGER
dredging up to 35/40 ft.

SMALL SELF-PROPELLED DREDGER
hopper capacity 150/200 tons

WORKBOATS/BOARDING LAUNCHES

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8 INCH SUCTION DREDGER
of post-war construction, powered by "Gardner" heavy duty diesel engine, 69 ft. by 21 ft. Dredging up to 20 ft.

MINIATURE 22 BUCKET DREDGER
22 ft. by 6ft. 6½ in. by 1 ft. 4½ in. This craft was designed and built by a famous yard for one man operation. In new condition.

SUCTION/GRAB DREDGER
Self propelled, 63 ft., powered by Deutz diesel engine. Hold capacity 60-70 tons.

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